

JCDA


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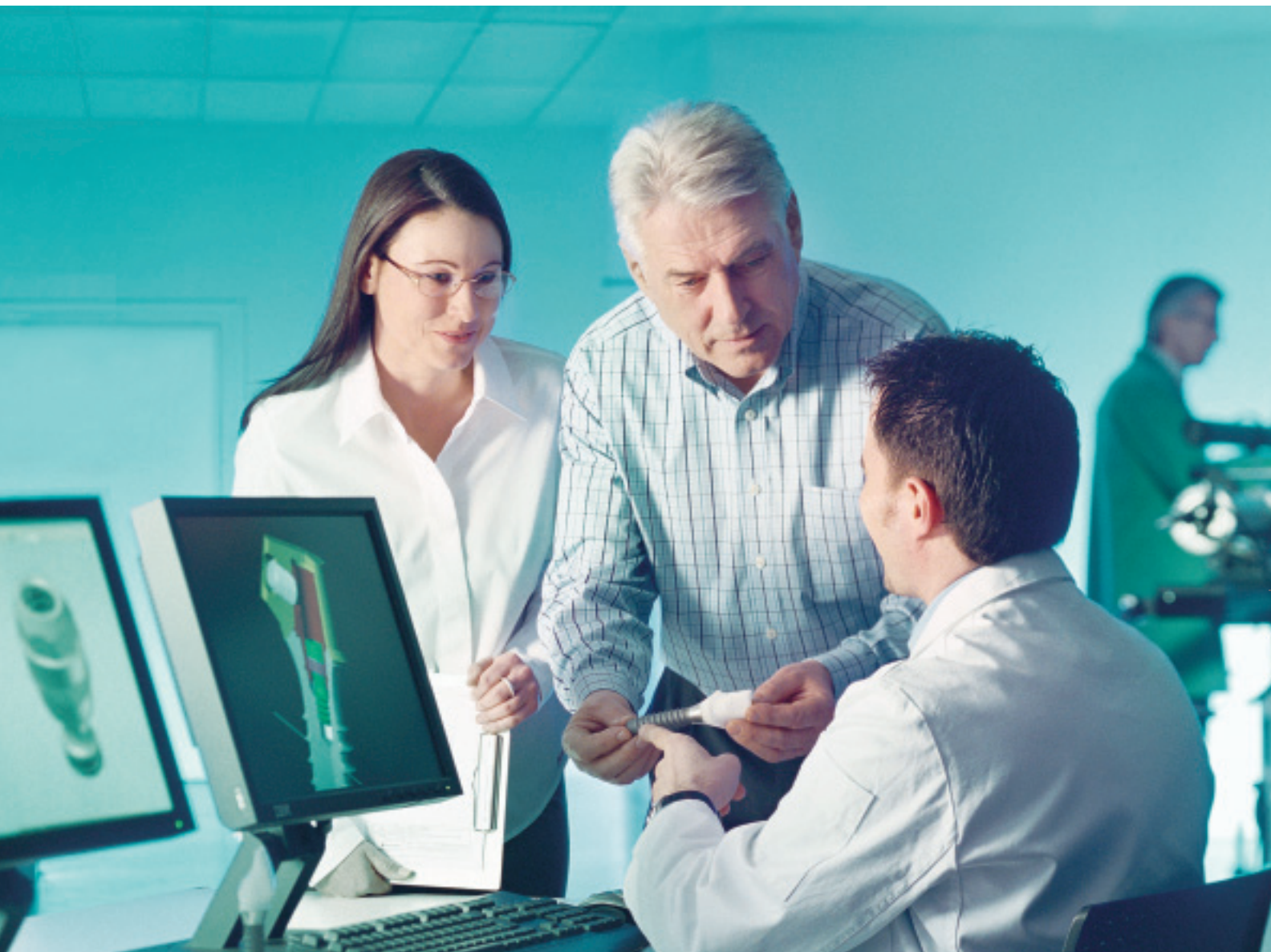
A woman with short brown hair and glasses, wearing a white lab coat over a red top, is smiling and holding a large, dark digital radiograph. She is standing in a dental office setting with a window and a red fire alarm pull station visible in the background.

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Dr. C. Grace Petrikowski

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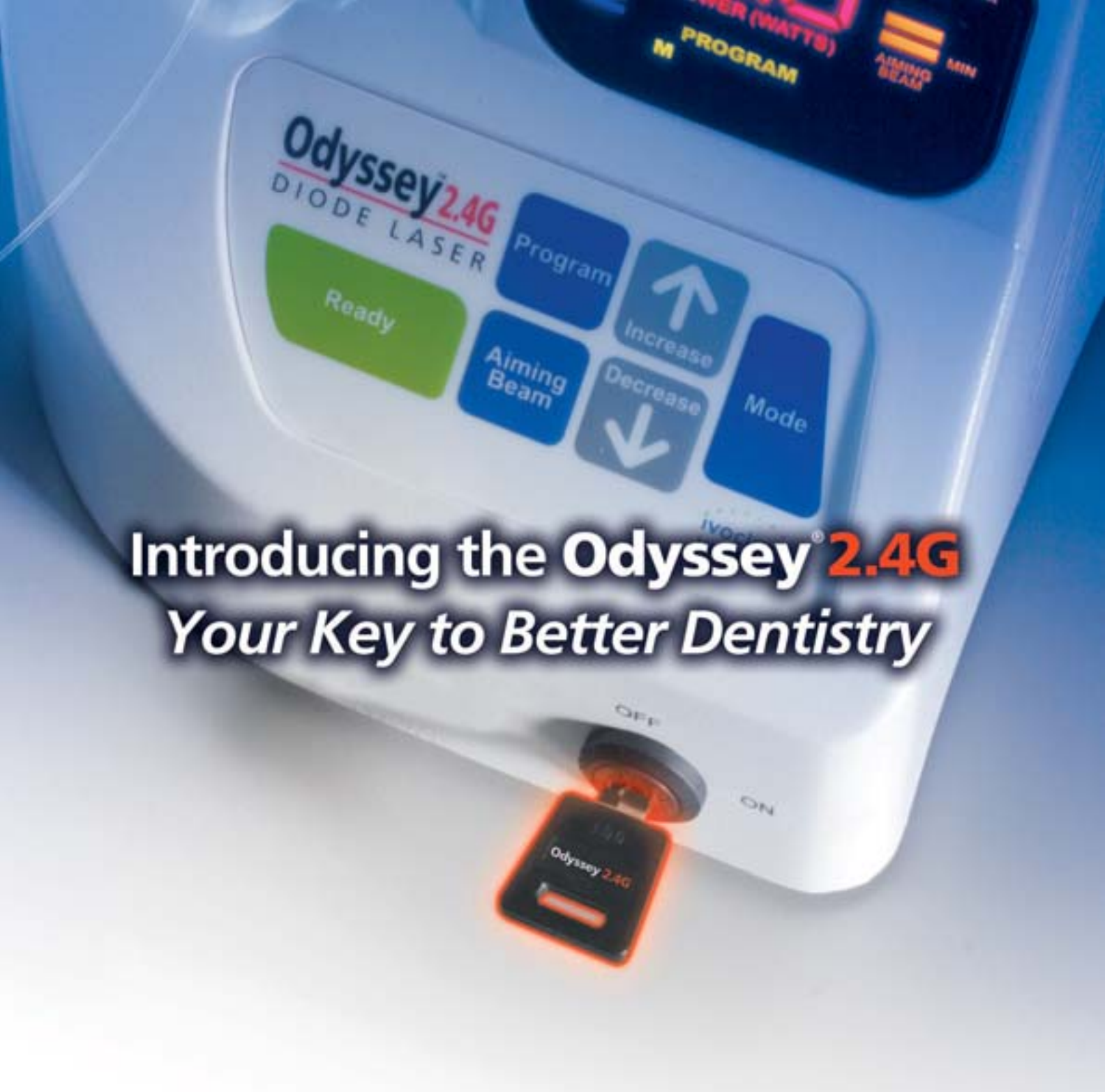


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Dr. John P. O'Keefe

A Cool Eye to the Future

The last time we conducted a full readership survey, you told us that paper-based publications are preferred for most of your professional information needs, except for urgent news.

Knowing this, we introduced *CDAAlert*, a service that allows us to immediately distribute important breaking news. Respecting your expressed desire to not receive frivolous information, we are very careful when selecting the content for these communications.

We currently send *CDAAlert* bulletins to over 6,000 members who have provided their e-mail address, on the promise that we would never divulge this address to third parties. Since that last readership survey, we have been building our capacity to communicate electronically with members. As most members have access to the Internet and a growing number have access at the office, we are confident that the Internet will become an important business tool for dentists.

With the development of ITRANS™, I foresee that the majority of Canadian dental offices will become "ITRANS-enabled" over time. I also believe that the ratio of paper-based and Internet-based communications between CDA and its members will evolve. While paper publications are not going away, there will be an increasing emphasis on electronic communications.

With an eye to this future, we continue to upgrade our Internet-based communication infrastructure. The primary aim of these changes is to provide members with high-quality information that is easily accessible and always available upon request. We also have an eye to the needs of potential members, the dental profession worldwide and the Canadian public.

Central to this strategy is the launch of a new and improved CDA Web site (www.cda-adc.ca). The overall appearance of the site has been enhanced and it is now considerably easier to

find information. There are a wealth of resources aimed at CDA members and other groups. There is no doubt in my mind that the priority for current and future developments to the Web site is the information needs of our members.

To assist members in accessing premium "members-only" content, the new site includes an "Edit My Profile" feature, where personal information, such as a mailing or e-mail address, can be updated. The "Remember Me" check box has been added to provide quick access to the members' section. Members who provide their e-mail address can also retrieve their password electronically should they forget it.

New information services that support CDA members as clinicians and businesspeople will continue to be unveiled over the coming months. The most recent of these services is LEXI-COMP Online, an online drug information database available in real time to members with Internet access.

Membership surveys indicated that dentists want reliable, comprehensive drug information available at their fingertips, especially when so many patients are taking complex mixtures of prescription drugs.

A really nice feature of LEXI-COMP Online is that it is geared specifically to the needs of dentists. When you retrieve information about a particular drug, you can easily look up its potential impact on the delivery of dental treatment and how it might modify the choice of local anesthetic solution for a patient.

LEXI-COMP Online is a good example of the type of practical, reliable information that we are committed to delivering to our members. Another example is *Editors' Choice*, where JCD A editorial consultants and other experts sift through the recently published dental and medical literature and choose a selection of high-quality clinical review articles for members to receive via e-mail. Many private publishers are allowing us to bring the full text of articles to our members on a temporary basis. Members are signing on for this service in increasing numbers each month.

Our dream is that dentists will be proud to be members of a modern and responsive organization that provides timely, reliable, accessible and pertinent information. Maybe some will even think the "C" in CDA stands for "Cool."

John O'Keefe
jokeefe@cda-adc.ca

LEXI-COMP Online is a good example of the type of practical, reliable information that we are committed to delivering to our members.

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

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12 hour plaque protection worth recommending



Dr. Jack Cottrell

“Launched successfully in 2004, ITRANS builds upon the CDAnet network, while offering users new features and capabilities.”

The Future of Claims Processing

As dental practitioners, we are always faced with decisions about introducing new technologies into our practice environment. I can recall colleagues who were hesitant about using CDAnet when it was first launched over 15 years ago.

CDAnet was designed by CDA to minimize the administrative burden in dental offices created by third-party insurance plans. This tool saved dentists time and money by ensuring that benefit claims could be sent electronically without paying transaction fees.

Since that time, computer infrastructure and software capabilities have grown exponentially. As such, ITRANS™ was developed to keep dentistry at the forefront of the emerging technology. Launched successfully in 2004, ITRANS builds upon the CDAnet network, while offering users new features and capabilities. It is the next step in the evolution of electronic claims transmission.

While it would be presumptuous of me to claim to be an expert on ITRANS, I thought it would be helpful to hear what colleagues are saying about this new tool. We have been gathering feedback from offices who have integrated ITRANS into their day-to-day operations. Here is a small sample of what people are telling us.

Dr. Martin Aidelbaum is an oral and maxillofacial surgeon from Surrey, British Columbia. He likes the fact that, with ITRANS, a dedicated phone line is no longer required:

“The dial-up modem used by CDAnet would sometimes be in the middle of a negotiation, and it wouldn't hang up cleanly. We also share the phone line with the outgoing fax and with the credit card or debit machine. The transmission would be broken if one of these went off, or it would prevent it from hanging up properly. You would then try to retransmit CDAnet and noth-

ing would happen. This is now a thing of the past with ITRANS.”

Glenda Danbrook describes her role at the Strasbourg Dental Clinic in Strasbourg, Saskatchewan, as a ‘jill of all trades.’ Although she is new to electronic claims processing, installing ITRANS at her clinic has resulted in dramatic improvements in claims processing time:

“Previously, all claims at the office were done manually so the turnaround time for payments, predetermination, coordination of benefits, claims was anywhere between 3 to 6 weeks! We notice a big difference with ITRANS and the feedback from patients has been tremendous.”

Trindy Reid is a dental assistant and receptionist at the office of Dr. Jeffrey Clark in Grand Bay–Westfield, New Brunswick. She found the transition to ITRANS to be quite straightforward:

“It's been a positive experience. There is relatively little to no learning curve with this product. I found it quite easy to learn how to use ITRANS because it was similar to what we've used before. I would call it a user-friendly system.”

Finally, Dr. Sanjay Uppal of Cambridge, Ontario, is pleased with the enhanced tracking and monitoring capabilities that ITRANS brings to his practice:

“One of the most exciting features of ITRANS is how it performs like the ‘FedEx’ of claims processing. With its various reports and printouts, we can now follow a benefit claim from beginning to end, allowing us to keep our patients informed about the status of their claims.”

These positive user experiences are merely a few examples of how our colleagues are benefiting today from implementing ITRANS in their offices. As one might expect, the ITRANS product offering continues to evolve and expand. There is a new financial option, with preferred payment rates on VISA, Mastercard and Interac direct payment processing now available through Paymentech Canada.

The success of ITRANS will benefit us all, so I would encourage you to enroll and incorporate this tool into your practice. As many colleagues have discovered, it is ready to help you now and for the future.

Jack Cottrell, BSc, DDS
president@cda-adc.ca

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FDI 2005 Is Already a Legend

FDI Montreal is history now, and I sincerely believe it has already achieved the status of legend. I wanted to congratulate all members of the organizing committee for doing such great work. (I admit, however, that I am no objective observer, as my family and I have enjoyed a very close relationship with CDA ever since FDI 1985 in Belgrade, where we met past-president Dr. Bradley Holmes.)

Montreal was the 26th FDI General Assembly/World Dental Congress in which I participated as a delegate of my dental association. Based on this vast experience, I can truly say that the Montreal venue and organization were outstanding.

The Congress Centre was perhaps the best meeting space we've ever had — spacious, everything in one location, friendly staff, superb technical assistance. The administration was exemplary. I remember all those colleagues with helping hands and smiles in the registration area. The scientific program was very interesting, the social program was attractive and the opening ceremony, impressive. And let's not forget the climate, the good food in Montreal, and last but not least, the legendary friendliness of Canadians.

I extend my sincere thanks to all the folks who put in such tremendous hard work to bring this to a good end. I really hope that everyone involved enjoyed themselves and are proud of what was accomplished.

*Dr. Stefaan Hanson
Executive director
Flemish Dental Association*

The Canadian Local Organizing Committee has organized the best FDI World Dental Congress we can remember. We enjoyed ourselves very much in your beautiful city of Montreal. The hotel, congress centre,

and scientific and social programs were "beyond all praise," and it was great to feel the affection and thoughtfulness displayed by all Canadian delegates. This Congress will be difficult to surpass or emulate in the years to come; there's no doubt that it has become the gold standard.

*Prof. Istvan Gera
Prof. Ildiko Marton
Hungarian delegation*

Editor's Choice Worth Membership Dues

Late in the evening, sipping a cool drink, I click through my e-mail inbox and come across CDA's latest *Editor's Choice*. After reviewing and saving each article, I think of the effort it would have taken me to get the same articles in 'the good old days' (early 1990s). I recall long evenings in the dental school library doing computer searches (no drinks allowed), finding the articles in the stacks and then hauling the journals to the photocopier. The room with the Xerox machine was an unventilated prison cell (also no drinks allowed), and you were out of luck if you didn't have the correct change. Furthermore, it was hit and miss whether I came across pertinent articles. That's not the case with CDA's *Editor's Choice* — the articles are all relevant and high calibre.

Even today with the advent of more efficient research methods, obtaining decent dental literature

still requires effort and time. MEDLINE searches can be done from home (although I have found that few of the e-journals I consider relevant are free) or the articles can be ordered from CDA's Resource Centre (also a great service). So, when I receive an e-mail with 4 very relevant articles that other dentists have reviewed and thought would be good topics for other general dentists, I can take another sip of my drink and rest assured that my membership dues are well worth it.

I should point out that I believe my membership dues are well worth it for an array of other reasons: CDAnet, ITRANS™, CDA Resource Centre services, JCDA, dealings with NIHB, etc.

*Dr. George Daguian
Orillia, Ontario*

WHO's Oral Health Research Priorities

In 2004, the World Health Organization (WHO) published *The World Report on Knowledge for Better Health* (www.who.int/rpc/meetings/pub1/en/index.html). The report reviews the current state of global health research and concludes that much more investment is needed for a new, innovative approach to research on health systems. In addition, stronger emphasis should be placed on translating knowledge into action to improve public health by bridging the gap between what is known and what is actually being done.

The WHO Global Health Programme outlines the needs for strengthening oral health research in the 21st century in a new

Editor's Comment

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

publication.¹ The WHO statements particularly consider the needs for strengthening research on risk factors for oral disease and chronic disease, quality of life and the oral disease burdens in developing and developed countries, oral health-general health relationships, oral health systems research, research capacity building in developing countries and translation of knowledge across countries.

Dr. Poul E. Petersen
Oral Health Programme
Chronic Diseases and Health Promotion
World Health Organization

Reference

1. Petersen PE. Priorities for research for oral health in the 21st Century — the approach of the WHO Global Oral Health Programme. *Community Dent Health* 2005; 22(2):71-4. Available from: URL: http://www.who.int/oral_health/publications/cdh_0522/en/.

Geriatric Dentistry in Canadian Universities

The May edition of *JCDA* reports that the University of British Columbia recently established the first professorship in dental geriatrics in Canada.¹ UBC should be congratulated for this initiative. However, Laval University is way out in front in this area. A graduate program in geriatrics has been in place at Laval for some years now, and the first graduate of the program, Dr. Josée Gagnon, has just received her MSc. The person responsible for the program is Dr. Christian Caron, who completed a PhD in the field of geriatrics before being appointed to the position. More information on the program can be obtained from the Web site of Laval's dental faculty.

Laval's interest in geriatrics is long-standing. In fact, in the fall of 1985, the university hosted the first symposium in the province on geriatric dentistry, under the leadership of Dr. Roland Vallée.

Thank you for your interest in the health of our senior citizens.

Dr. Bernard Jolicoeur
Fermont, Quebec

Reference

1. UBC establishing dental geriatrics professorship. [News] *J Can Dent Assoc* 2005; 71(5):315-6.

Passing the Word Around about Children's Oral Health

I have just learned that my 4-year-old daughter has 11 cavities. I am shocked and worried. When I first took her to the dentist, I received 2 pamphlets: *Growing up...What It Means for Your Child's Dental Health* and *The ABCs of Caring for Your Child's Teeth*. They are excellent to read and help parents understand the importance of caring for their children's teeth.

I wish I had received this information when my daughter was born. I think most of us don't think of taking a child to the dentist when he or she is 2 or 3 years old. Because of what my daughter needs to go through to get her teeth fixed, I thought I should do something to prevent it from happening to other children.

Is it possible for the Canadian Dental Association to give these pamphlets to new parents at the time of the baby's birth or when the parents bring the baby for the 6-month immunization visit at the community health centre? It is so important for the parents to understand early how to take care of their children's teeth. I am a very caring mom and feel bad that my daughter has to have all these dental treatments to fix her teeth now. I wish I had had this knowledge before.

I hope that by writing this letter I can make a small difference in the lives of other parents and their children.

Ms. Cindy Cheng
Calgary, Alberta

Editor's Note: The CDA public Web site contains oral health information similar to that found in the Dental Information System pamphlets. CDA hopes that its efforts to promote its Web site and that its public

education campaigns will allow parents to obtain the kind of information they need to take care of their children's oral health.

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Visit www.cda-adc.ca today to learn more.



* Using select member services and advocacy outcomes, an independent consultant has calculated that individual practitioners can add more than \$15,000 annually to their bottom line.

New Record for DAT Applicants

Registration figures for the upcoming Dental Aptitude Test (DAT) were the highest in the program's almost 40-year history.

Fatna Moussali, coordinator of the DAT program, confirmed that 1,464 applicants registered to write the DAT examination in November 2005.

"These record numbers seem to indicate that demand to enter the dental profession remains strong," says Ms. Moussali. "The successful integration of online registration is also a contributing factor to the large number of applicants."

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.

More information on the DAT can be found at www.cda-adc.ca/dat. ♦

Annual Academic Event Update

The Canadian Dental Association (CDA) is finalizing its 2005 Academic Event, scheduled for November 26 in Ottawa.

This year, the presentations and discussions will focus on the role of the federal government in the funding of research infrastructure, the development of appropriate funding programs for academic and research personnel and the long-term negative impact of heavy student debt loads.

The discussions on student debt load are timely, as figures released by Statistics Canada on September 1, 2005, show that tuition fees in dentistry remain the highest of all professional programs and continue to rise at higher rates than other programs.

The Academic Event serves as a forum for academic dentists, practitioners, regulators, industry representatives, students and other key stakeholders to convene and discuss topics of mutual concern. This year's event is the fourth in a series of conferences that began with the Dental Summit in 2002.

CDA continues to work with the federal government, the National Professional Association Coalition on Tuition (NPACT), dental universities and the Canadian Institutes for Health Research (CIHR) to ensure the future viability of dental schools, and therefore, the profession of dentistry in Canada.

During the 2004 Days on the Hill meetings, CDA representatives met with key parliamentarians to recommend that financial support systems for students adapt yearly to fluctuations in tuition levels. The Association also asked that a minimum of 3.5% of research funding be devoted to oral researchers. In 2004, less than 1% of CIHR funding was awarded to oral research, despite the fact that 7% of overall national health expenditures were spent on oral health care.

CDA would like to acknowledge Septodont, Philips Sonicare, Wyeth Consumer Healthcare, Hu-Friedy, Nobel Biocare, Royal Bank of Canada, Cadbury Adams (Trident Gum) and the Dentistry Canada Fund for their generous support of the 2005 Academic Event. ♦



Cheese Puts the Bite on Cavities

Dentists will find campaign materials in this month's edition of *JCDA*, courtesy of an ongoing joint initiative between CDA and the Dairy Farmers of Canada.

The Dental News Flash and a poster are enclosed, illustrating the benefits of eating dairy products as part of a well-balanced diet.

By displaying this poster in your patient waiting areas, you can help reach Canadians with the message that dairy products play a vital role in maintaining good oral and overall health. ♦



(L. to r.) Dr. Wayne Halstrom, CDA president-elect, Ms. Jenny Hui, University of British Columbia, Mr. George Rhodes, vice-president, professional relations and corporate communications, Dentsply International.

UBC Student Wins Research Competition

The CDA/Dentsply Student Clinician Program took place on August 25 in Montreal.

Jenny Hui from the University of British Columbia (UBC) was awarded first prize for her research project on the effect of endogenous retinoids on chicken limb patterning.

Raymond Zhu from the University of Manitoba was awarded second prize for his table clinic on the characterization of optical methods for detecting dental caries.

Sponsored by Dentsply International and managed by CDA, this table clinic research competition is open to dental students from each accredited dental school in Canada. Participating students must also be members of CDA. The program provides a forum to stimulate ideas, improve communication and increase student involvement in the advancement of the dental profession.

This year's competition was held during CDA's Annual Convention, which ran parallel to the FDI Annual World Dental Congress. Dentsply International generously sponsored all of the students' expenses to attend the Convention. First prize was an all expenses-paid trip to the 2005 Annual Session of the American Dental Association and Technical Exhibition in Philadelphia, Pennsylvania, to be held in October. Second prize was a \$500 cash award. ♦

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Canadian Dental Students' Conference

Receiving more input from dental students to help plan future CDA initiatives was one topic of discussion at this year's Canadian Dental Students' Conference, held August 5 in Ottawa.

This annual conference brings together the junior and senior CDA student representatives from the 10 Canadian dental schools. A panel discussion on the realities of life after dental school gave everyone the chance to talk about the transition from dental school to a dental career. Students shared their thoughts on such issues as rising tuition fees, student loan policies, qualifying programs, school

curriculum and obtaining practice management skills.

This year's conference included presentations from representatives of CDA, the Dentistry Canada Fund (DCF), the Canadian Dental Service Plans Inc. (CDSPI), the National Dental Examining Board and the Association of Canadian Faculties of Dentistry.

CDA gratefully acknowledges DCF and Procter & Gamble for their generous support of the Students' Conference. Further details on the conference, including a video of the day's events, will be posted to the student section of the CDA Web site. ♦



Valarie Vasku, communications manager of the Dentistry Canada Fund (DCF), presents a DCF-Oral B Laboratories undergraduate scholarship to Bradley McNiven of the University of Manitoba.

UK Health Agency Issues Guidance on HealOzone

The National Institute for Health and Clinical Excellence (NICE) in the United Kingdom published a guidance on the use of HealOzone within the NHS, the UK's national public health service.

In a July 27 press release, a NICE representative concludes that “there is not enough reliable evidence to show that HealOzone is more effective than existing treatments for decay of the biting surfaces and roots of the teeth.”

The statement says that NICE does not recommend HealOzone as a treatment for tooth decay unless it is being used as part of a clinical trial. The agency will review its position in 2008, hoping that more clinical evidence will be available at that time.

NICE is an organization that provides national guidance on the promotion of good health and the prevention and treatment of ill health for the NHS in England and Wales.

HealOzone is a relatively new technology, introduced for the treatment of fissure caries, smooth surface caries and approximal or cervical caries. The manufacturer of the product is KaVo and SciCan is the Canadian distributor. ➤

Related Resource

NICE Guidance on HealOzone

www.nice.org.uk/page.aspx?o=TA092

Commentaries

Dorothy McComb, BDS, MScD, FRCD(C), is a professor and head of restorative dentistry at the faculty of dentistry, University of Toronto.

JCDA sought the insights of Dr. McComb after the NICE guidance on HealOzone was published.

Clinical treatment requires evidence that it is effective. In an era of more rigorous analysis of the strength of the evidence, the NICE statement echoes a 2004 Cochrane review that concluded “there is no reliable evidence that application of ozone gas to the surface of decayed teeth stops or reverses the decay process. There is a fundamental need for more evidence of appropriate rigour and quality before the use of ozone can be accepted into primary dental care or can be considered a viable alternative to current methods for the management and treatment of dental caries.”¹

Caries in the 21st Century — Minimally Invasive Dentistry

Caries is a complex, multi-factorial disease in which lesions are indisputably the result of dietary sugars and plaque bacteria. It has long been known that early lesions are reversible and arrest depends on long-term positive change in the local environment and patient caries risk behaviour.² Operative treatment is discouraged given the potential for restoration failure and the negative consequences of the re-restoration cycle. Current teaching strongly emphasizes *proven* nonoperative strategies for early caries management focusing on patient education and disease control, including measures to reduce plaque and oral microbial levels, dietary modification, fissure sealants and remineralization strategies.

JCDA sought the comments of SciCan, the Canadian distributor of HealOzone, after the NICE guidance was published. They invited us to contact Stephen Gaines, BSc, DDS, a private practitioner from Oakville, Ontario.

Ozone has been used in health sciences since the latter part of the 19th century. Its continued use throughout the 20th century in surgical medicine and for blood supply and water purification purposes can be attributed to the work of ozone research pioneers. The effects of ozone on bacteria and viruses have been documented as far back as 1892. Therefore, it is not hard to understand why, once again, ozone is of prime interest, this time in the area of dental medicine for the treatment of a bacterial infection, namely dental caries.

Health Canada approved the use of HealOzone in December 2003. The device is currently used by over 5,000 practitioners in more than 30 countries. With over 5,000,000 sites treated, the pool of potential clinical evidence is growing rapidly. I have been successfully using HealOzone with remineralization therapy for one year, predictably arresting the caries process and re-hardening previously “infected” dentin. With first-hand clinical experience, I can attest to, and have documented, the

Ozone Treatment

Ozone gas is a strong oxidizing agent with the ability to kill bacteria upon contact. It has been suggested that ozone can be used to eliminate or reduce the bacterial count, and therefore to arrest or delay the progression of caries. However, lesions must be accessible to the ozone delivery cup, which must tightly fit the selected area. Available research involves only root caries or occlusal fissures, and although significant initial microbicidal effect has recently been documented for root caries, the study was short (5.5 months) and included no monitoring of expected bacterial re-colonization.³

When fissure sealants alone are placed over occlusal caries, there is a significant reduction in microorganisms and compelling evidence of caries arrest has been provided over 10 years.⁴ Efficacy of alternative treatment with ozone or necessity for preliminary ozone treatment will require justification.

Dentists need to recognize the limitations of the available data. The cost of the technology is not insignificant to both dentists and patients, and important questions about efficacy remain unanswered. ♦

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3. Baysan A, Lynch E. Effect of ozone on the oral microbiota and clinical severity of primary root caries. *Am J Dent* 2004; 17(1):56–60.
4. Mertz-Fairhurst EJ, Curtis JW Jr., Ergle JW, Rueggeberg FA, Adair SM. Ultraconservative and cariostatic sealed restorations: results at year 10. *J Am Dent Assoc* 1998; 129(1):55–66.

practical clinical effectiveness of HealOzone with remineralization.

I agree that dental science requires sound research and well-designed studies to validate new technologies and treatment paradigms. A larger question remains: While quality research is in the process of being published (as with HealOzone), why should clinical dentistry remain stuck in a historical, yet scientifically validated, paradigm of failed sealants, failed macrodental restorations, recurrent caries, fractured heavily restored teeth, bacterial induced pulpitis and tooth loss?

We have been taught that macro-invasive amputative dental concepts are the proven treatments for the microbiologic problem of dental caries. As change for the better is unavoidable, it is time for our dental educators, academic researchers and general dental practitioners worldwide to embrace the concept of the minimally invasive treatment philosophy and help play a part in the investigation and scientific validation of ozone and remineralization therapy. ♦

“Creative thinking may mean simply the realization that there is no particular virtue in doing things the way they have always been done.” – Rudolph Flesch.

P.E.I. Launches Seniors’ Oral Health Screening Project

Beginning in October, oral health screening examinations will be conducted on seniors in various locations throughout Prince Edward Island.

“We hope that participating seniors will gain insight and understanding of their own oral health,” says Dr. Barry Maze, director of the dental public health program and member of the Seniors’ Oral Health (SOH) steering committee in P.E.I. “The screenings will be useful to collect data about the oral health status of Island seniors. The information we collect will be used to plan dental services for seniors.”

All P.E.I. residents age 60 and over are eligible for the program, whether they have their own natural teeth or dentures and whether or not they see their own dentist regularly. The screening will take about 30 minutes and will include a self-report component and a clinical examination.

“Each senior participant will receive important advice and helpful recommendations from the dental hygienist and dentist

conducting the screening,” explains Dr. Maze.

The idea for this project began in October 2004, when a provincial Seniors’ Oral Health Forum brought seniors, health planners and health providers together to discuss issues and make recommendations on seniors’ oral health. Following the establishment of the SOH steering committee, one of the first recommendations was to gather data on the level of the oral health of seniors in the province.

SOH steering committee member Dr. Jamie Hodgson of Charlottetown, P.E.I., also attended the CDA Forum on Seniors’ Oral Health in February 2005.

The P.E.I. initiative is supported and will be conducted by the Dental Association of PEI, the Dental Hygienists Association of PEI, the Seniors United Network, the PEI Seniors Federation and Dental Public Health. The project is coordinated in conjunction with the Nova Scotia Seniors’ Oral Health Project. ♦

SURVEY OPT-OUT FORM



CANADIAN
DENTAL
ASSOCIATION

From time to time, the Canadian Dental Association (CDA) conducts surveys to seek your opinion about various issues relating to dentistry. If you do **not** wish to receive such surveys, please let us know by filling out and mailing the form below to:

Sylvie Dupuis, Coordinator, Membership Database
Canadian Dental Association
1815 Alta Vista Drive, Ottawa ON K1G 3Y6
Or fax it to (613) 523-7736
Or e-mail us at member-service@cda-adc.ca

Name _____

To assist us in locating your record in our database, please provide the following:

Membership number if applicable: _____

Phone number, with area code: _____

Postal code: _____

- I do **not** wish to receive surveys.
- Leave my address as is.

Change my address to _____



PROMOTIONAL MATERIALS OPT-OUT FORM



CANADIAN
DENTAL
ASSOCIATION

From time to time, the Canadian Dental Association makes arrangements with select companies and organizations to send their promotional materials to dentists across Canada. If you do **not** wish to receive any promotional materials, please let us know by filling out and mailing the form below to:

Sylvie Dupuis, Coordinator, Membership Database
Canadian Dental Association
1815 Alta Vista Drive, Ottawa ON K1G 3Y6
Or fax it to (613) 523-7736
Or e-mail us at member-service@cda-adc.ca

Name _____

To assist us in locating your record in our database, please provide the following:

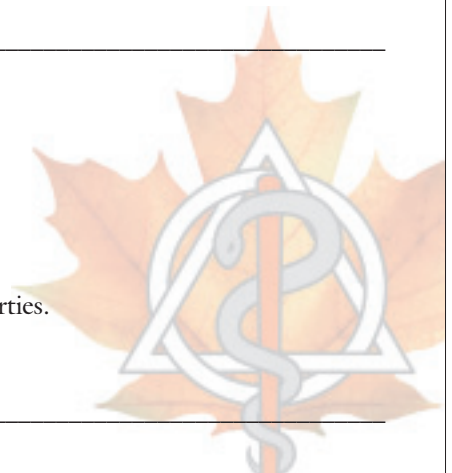
Membership number if applicable: _____

Phone number, with area code: _____

Postal code: _____

- I do **not** wish to receive any promotional materials from third parties.
- Leave my address as is.

Change my address to _____





Canadian Dentist Wins Sleep Medicine Award

Dr. Gilles Lavigne of the University of Montreal was presented with the Pierre Robin Academic Award from the Academy of Dental Sleep Medicine in Denver, Colorado, on June 17, 2005.

Dr. Lavigne is the second Canadian to be recognized for contributions in dental sleep medicine. Dr. Alan Lowe of Vancouver, B.C., was the first recipient of this same award in 1999.

The award is given to individuals who have exhibited exceptional initiative and progress in the areas of education and academic research with original contributions to the field of dental sleep medicine.

Dr. Lavigne is a professor in dentistry, physiology and psychiatry at the University of Montreal. He is director of the Quebec Oral Health Research Network (FRSQ) and co-director of the Quebec Pain Research Initiative (VRQ).

His primary research interests are in the fields of sleep bruxism, interactions between sleep and pain, and placebo effect mechanisms. He has published over 100 articles in peer-reviewed journals and was co-editor of *Orofacial pain: from basic science to clinical management* (Quintessence, 2001). ♦



Mr. Daniel P.L. Leger

Appointment of NBDS Registrar

Mr. Daniel P.L. Leger is the registrar of the New Brunswick Dental Society (NBDS), effective August 2005.

A graduate of law from the University of New Brunswick, Mr. Leger is an associate with the Patterson Palmer law firm. He practises throughout the province with a focus on labour and employment law and civil litigation.

Mr. Leger will be available at NBDS offices on Fridays and can be contacted at (506) 452-8575. ♦



Dr. Leland R. McFadden

CAOMS Names New President

Dr. Leland R. McFadden was officially named president of the Canadian Association of Oral and Maxillofacial Surgeons (CAOMS) at its 52nd annual meeting in Halifax, Nova Scotia, on June 24, 2005.

Dr. McFadden is president of the Manitoba Dental Association and past-president of the Manitoba Association of Oral and Maxillofacial Surgeons.

He maintains a private practice as an oral and maxillofacial surgeon in Winnipeg and is an assistant professor in the graduate program in oral and maxillofacial surgery at the University of Manitoba. Dr. McFadden is also a Fellow and examiner for the Royal College of Dentists of Canada. ♦

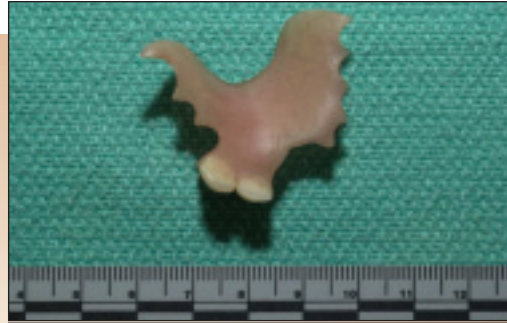
OPP Requests Help Identifying Body

The Guelph Detachment of the Ontario Provincial Police (OPP) is seeking help in identifying the decomposed remains of a woman found at a rest area on Highway 7, in Eramosa Township east of Guelph, Ontario, on August 28, 2005.

There were signs of previous facial injury, consisting of a broken nose and left eye socket. The left eye socket injury lines up with the 2 teeth on the partial upper dental plate. This dental plate may have been required as a result of this injury. Other previous injury was to the left seventh rib at the front of the rib cage.

The unidentified female was described as white, 35 to 45 years of age, 160 to 170 cm in height and weighing approximately 60 kg.

Anyone having information about the identity of the body should notify detective constable Dave Beckon, Guelph Detachment, OPP. Tel.: (519) 822-7250 or 1-888-310-1122. ♦



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Management of Dental Waste

A new manual that outlines the best practices for the proper management of dental wastes is now available on the Environment Canada Web site.

Dental Wastes Best Management Practices Guide for the Dental Community is designed to provide dentists with a practical resource on the handling and disposal of dental wastes that meet current environmental standards.

The guide describes best practices for the management of heavy metals, biomedical, pathological and chemical wastes. It is particularly relevant in light of the Canadian dental profession's goal of reducing the amount of mercury released from dentistry into waste waters by 95% in 2005, from a baseline of 2000. Dentists can help achieve these levels if they voluntarily install an ISO 11143 certified (or equivalent) amalgam separator at their practice.

While the guide is based on the Ontario Dental Association manual *Best Practice for Managing Dental Wastes*, it also includes information from the Canadian Standards Association, the Canadian Council of Ministers of the Environment and the Canadian Dental Association.

This resource can be accessed at www.ec.gc.ca/MERCURY/DA/ONBMP/EN/main.cfm. ♦

WHO

WHO Publishes Theme Issue on Oral Health

For the first time in its history, the World Health Organization (WHO) dedicated an entire issue of its publication, *Bulletin of the World Health Organization*, to oral health issues.

The September 2005 edition of the *Bulletin*, also known as *The International Journal of Public Health*, is a special themed issue with all articles examining various oral health issues from across the globe.

Articles explore the global burden of oral diseases, oral health information systems and oral health promotion in schools. To access the table of contents and articles of the *Bulletin*, follow the links at www.who.int/bulletin/volumes/83/9. ♦

OBITUARY

A.W.S. WOOD, DDS, FRCD(C), 1917–2005

Dr. A.W.S “Art” Wood — “The Father of the Mouthguard” — passed away at his home in Mississauga, Ontario, on July 11, 2005, at the age of 88.

Born in Alameda, Saskatchewan, he learned to play hockey like so many of his day, on an outdoor rink when Eaton’s catalogues stuffed down his socks were the only means of injury protection. His first career was as a rural schoolteacher until he enrolled at the faculty of dentistry, University of Toronto, graduating with his DDS degree in 1943. He immediately entered the Canadian Army Dental Corps and served overseas in Britain and Europe. Following wartime hostilities, Dr. Wood undertook post-graduate studies at the University of Illinois and Northwestern University and was the first Canadian dentist to obtain specialty training in pediatric dentistry.

Returning to practise in Canada, his personal sports mission began in the early 1950s, when as dentist and coach for the Cooksville Hockey Association minor hockey team, he was appalled at the number and frequency of head and mouth injuries. With the help of fellow coach Charlie Patterson, an engineer and researcher at the University of Toronto, Dr. Wood transformed his basement into a research laboratory. He concentrated on the creation of a mouthguard, while Mr. Patterson worked on a protective helmet. Soon after, mouthguards were



Dentistry Canada Museum display honouring Dr. Art Wood.

made mandatory for the Cooksville Hockey Association and the entire Mississauga Hockey League followed shortly. The rest, as they say, is history.

In 1970, Dr. Wood was appointed Canadian Dental Association (CDA) spokesperson to the Canadian Standards Association’s (CSA) Equipment for Athletes Committee. With the collaborative efforts of dedicated individuals such as ophthalmologist Dr. Thomas Pashby and orthodontist Dr. Frank Popowich, the CSA first produced the headform *Allan Average* in 1983 for testing helmets and face protectors for 5- to 10-year olds. In 1993, the same group created a new adult headform that was sculpted and cast in resin by Dr. William McIntosh, CDA past-president and the Association’s executive director from 1966–77.

Dr. Wood’s dedicated and inventive career led to many well-deserved honours, no less than the Order of Canada in 1992. He was a founding member and president of the Academy of Sports Dentistry, president of the Canadian Academy of Paedodontics, recipient of the CDA Distinguished Service Award and a member of the Mississauga Hockey Hall of Fame in Ontario. In 1990, he received the Canada Volunteer Award Medal and Certificate of Honour.

Nor did Dr. Woods’ passion for safety remain within sporting activities. He served for almost 50 years on the Mississauga Traffic Council, which he helped co-found. He also helped develop crossing guard programs at contentious traffic corners and the “Kiss and Ride” drop-off program from which generations of schoolchildren have benefited. ♦

— Dr. Ralph Crawford

To access the Web sites mentioned in this section, go to October’s *JCDA* bookmarks at www.cda-adc.ca/jcda/vol-71/issue-9/index.html.

Products Bearing the CDA Seal of Recognition

Cadbury Adams

Trident Sugarless Bubble Gum
Trident Cherry Sugarless Gum
Trident Cinnamon Sugarless Gum
Trident Citrus Fruit Sugarless Gum
Trident Freshmint Sugarless Gum
Trident Peppermint Sugarless Gum
Trident Raspberry Twist Sugarless Gum
Trident Spearmint Sugarless Gum
Trident Tropical Twist Sugarless Gum
Trident Very Berry Sugarless Gum

Church & Dwight Ltd.

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

Colgate Palmolive Canada Inc.

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

Combe Incorporated

Cepacol Antibacterial Mouthwash with Fluoride (Peppermint)

Gillette Canada

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

GlaxoSmithKline

Aquafresh Extreme Clean Toothpaste
Aquafresh for Kids Toothpaste
Aquafresh Multi-Action Whitening Toothpaste
Aquafresh Sensitive Toothpaste
Aquafresh Whitening Toothpaste
Aquafresh Whitening Mint Advanced Freshness Toothpaste
Sensodyne Toothpaste for Sensitive Teeth
Sensodyne-F Baking Soda Clean Toothpaste
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Sensodyne-F Mint Toothpaste
Sensodyne-F Revitalizing Whitening Toothpaste
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REACH Dental Floss Shred Resistant
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Listerine Antiseptic Original Mouthwash
Listerine Antiseptic Tartar Control Mouthwash
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Crest Clean FreshMint Paste (baking soda & tartar control)
Crest Complete Clean Mint Gel
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Canadian Dentist Wins FDI Presidential Election

Dr. Burton Conrod of Sydney, Nova Scotia, was voted president-elect of the FDI World Dental Federation at the 2005 Annual World Dental Congress (AWDC) in Montreal.

Dr. Conrod's election victory marks the first time a Canadian dentist has been selected to lead this prestigious international organization. He will begin a 2-year term as FDI president in 2007, following Dr. Michèle Aerden of Belgium.

The Canadian Dental Association (CDA) past-president sat down with *JCDA* to reflect on his election victory and discuss his vision for the future.

JCDA: *What are some of the greatest challenges facing the dental profession on a global level? How do you intend to address these challenges in your new role?*

Dr. Burton Conrod (BC): In some regions, there is an urgent need for public education about HIV/AIDS or noma (cancrum oris). Other areas suffer from severe shortages of dental human resources. The inability of some

countries to form active national associations to support dentists in their practices and provide oral health education to the public is an area where FDI can provide support.

FDI should develop a better framework to offer advice and supply administrative services to new member associations. The Federation can act as a nexus of information and organize assistance from some of the more established associations.

As president-elect, I will also chair a Task Team on Member Subscriptions to determine if there is a better way to recognize the varying abilities of national member associations to pay their dues based on certain economic indicators. I will continue to champion the creation of an FDI Foundation to streamline fundraising and make funds available to subsidize membership dues and travel costs for smaller associations.

FDI must find the resources to enable more delegates to attend the AWDC and therefore allow more countries to participate in the creation of future policies.

JCDA: *What about some of the challenges facing global oral health?*

BC: Oral health is not high on the agenda of government health officials in many countries. The FDI World Dental Development and Health Promotion Committee (WDDHPC) recently held very successful oral health planning workshops in Africa that resulted in a number of countries developing oral health policies and some appointing chief dental officers for the first time.

While it took several years to organize and stage these meetings in conjunction with the World Health Organization (WHO), the WDDHPC now needs the resources and support to repeat this process in other regions, such as Latin America.

The growing disparity between rich and poor countries is evident in the vastly different levels of oral health around the world. In general, the least developed countries are more susceptible to the ravages of sugar and tobacco use that tends to escalate as fledgling economies begin to improve. Public education pilot programs must be developed to warn of the dangers of tobacco and sugar consumption and FDI can take a leadership role in these areas.



Dr. Burton Conrod is congratulated by FDI president Dr. Michèle Aerden after being voted FDI president-elect.



Dr. Conrod with FDI Councillor Dr. T.C. Wong.

Such global initiatives require consensus building and the formation of partnerships with national associations and the dental industry. I feel I have the ability to facilitate the development of these programs.

JCDA: *What will be the main priorities of your mandate as FDI president-elect?*

BC: One of my primary responsibilities as president-elect is to chair the Governance Task Team. Part of its agenda is to revise all FDI manuals, which cover everything from proper conduct of business at the General Assembly to how FDI committees carry out their work plans.

I intend to use my time as president-elect to become better acquainted with the leaders

of global dentistry and learn more about the issues faced by different regions. FDI could be more effective by increasing its involvement at meetings of the Regional Organizations held throughout the year. Working with member associations during the time between the Annual Congress would increase the coordination of FDI's dental continuing education programs, pilot preventive programs and public education efforts.

JCDA: *How do decisions made at a global level at FDI affect Canadian dentists at a local level?*

BC: A global perspective is required in most businesses today and dentistry is no exception. I hope my election as FDI president-elect might make Canadian dentists more aware that we are treating an international patient population. We must be attuned to the cultural and ethnic diversity of our patients.

Oral health issues are similar in most countries, differing primarily in the magnitude of the problem. There are a host of global issues where we can learn from solutions employed beyond our borders.

One of the main functions of FDI is to promote the exchange of ideas on issues ranging from the cost-effectiveness of public health programs to the latest methods in tobacco control. Canadian dentists are exposed to these ideas through participation at the AWDC, with FDI committees and contributions to the *International Dental Journal* or our own *JCDA*.

FDI has worked with the WHO to develop treatment recommendations for SARS patients and the role of the dentist in tobacco control. CDA helps to inform Canadian dentists of these resources that, in turn, influence how we practise.

Policy statements on oral health issues, such as infection control or dental implants, are another important contribution that FDI makes toward elevating the importance of oral health.

JCDA: *Can you discuss Canada's presence within organized dentistry at an international level?*

BC: Canada is a world leader in dentistry. Through our involvement with FDI, our national association has developed a valuable network of global experts who are willing to



The Conrod family celebrating in style atop Mount Royal.



Dr. Conrod and his daughter Susan, with outgoing FDI president Dr. H.R. Yoon.

offer advice and knowledge to help us develop effective policies and practices.

Canada's influence internationally is a direct result of CDA's efforts in leadership development. CDA has always been committed to the principles of good governance and has provided educational leadership experiences to committee and board members. Such experience resulted in my election to 2 terms on the FDI Council.

The Canadian delegation has a history of making reasoned and valuable interventions at the FDI Annual World Dental Parliament. CDA is viewed as a well-run organization whose leaders are able to apply their skills to international issues.

Other examples of this international leadership are *JCDA* editor-in-chief Dr. John O'Keefe, who was named chair of the FDI Communication and Member Support Committee, CDA executive director George Weber's election as vice-chair of the WDDH-PC, and CDA past-president Dr. Tom Breneman's service on the FDI Finance Reference Committee.

JCDA: *How will this new role affect you on a professional and personal level?*

BC: My professional life has always included involvement in organized dentistry and this new position represents the ultimate expression of my involvement. I intend to continue practising full-time, with the very understanding assistance of my practice partner (and wife) Connie.

My wife and 3 children have always supported my association work and they encouraged me to pursue this challenge knowing that in 4 years time I will be older, wiser and more available for family responsibilities. My ambition to become an expert fly fisherman has been put on hold for now!

JCDA: *Would you like to thank anybody for helping with your election campaign?*

BC: The Board of Directors, the entire staff of CDA and many CDA past-presidents were solidly behind me, giving constant encouragement and assistance when it was needed most. My formal campaign team was led by George Weber and consisted of Dr. John O'Keefe and Katharine Acs-Charter, CDA coordinator of corporate meetings and events.

Designing a campaign platform and print materials to appeal to all languages and cultures was a challenge. This group provided patient encouragement that guided me through numerous presentations, correspondence and drafts of campaign materials. They also ignited the flame among key leaders in many countries who agreed to help support my candidacy.

The professionalism, knowledge and communication skills of these 3 individuals are responsible in large measure for my victory. It was a group effort, and the credit and my sincere thanks go to all of these people. ♦

Look for highlights of the
2005 FDI Annual World Dental Congress
in the November *JCDA* and
on the CDA Web site.

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Office Fraud — No Business Is Safe

JCDA approached Paul Jamieson, the founder of Maritect Ltd., for his professional insights into employee fraud in the dental profession. Maritect Ltd. is a full-service security and investigations company based in Sydney and Halifax, Nova Scotia, since 1979. A former member of the RCMP, Mr. Jamieson specializes in performing internal and fraud-related investigations.

JCDA: Could you identify some typical scenarios of fraud that you have encountered in a dental practice setting?

Paul Jamieson (PJ): Two of the more common investigations I have come across involve the employee who receives the money, cheques, credit or debit card purchases and insurance claims. This employee is also responsible for preparing the daily deposit slip and performing the actual bank deposit.

The problem begins when this individual does not make the bank deposit on the same day the deposit is prepared. This employee siphons off some or all of the money and holds on to the deposit until he or she can make up the difference from other deposits. In the beginning, the deposit amounts are small but over time they can accumulate to hundreds of dollars per deposit.

A second scenario involves the bookkeeper or the person at reception who gives receipts and makes entries into the dental accounting software. This person often believes it is possible to make changes to the entries without creating an audit trail.

This scenario follows a general *modus operandi*. Let's say, for example, that a client comes into the practice to pay \$100 cash on an account. The staff member takes the money and gives the client a receipt for \$100, generated from the accounting software. Sometime later,

this employee goes back into the same account and switches the payment from \$100 to \$50. At the end of the day, the deposit slips and print-outs would only show the \$50 entry while the employee pockets the other \$50.

JCDA: Many of our member dentists are small business owners. Are they more vulnerable to certain types of fraud?

PJ: No business is immune to theft or fraud in the workplace. I have performed investigations ranging from clients who have lost over one million dollars worth of milk in a dairy product facility, to the small convenience store owner whose employees are scratching the lotto tickets before paying, if they even pay at all!

Usually in a dental practice environment, it is the person who looks after the handling of money who is the one that steals. Small dental practices can be more vulnerable to fraud than larger practices if they only have one person performing multiple financial tasks.

When possible, different staff should be responsible for giving receipts, handling cash and doing the deposit or making entries into the software. In a larger practice, theft can be harder to detect and the dollar amounts have the potential to be significantly higher than in a smaller practice.

JCDA: What indicators of fraud should a dentist be looking for?

PJ: A couple of warning signs that both small and larger practices should be aware of are minor discrepancies in the bank deposits or an employee who always volunteers to perform the deposit, even during vacations.

With regard to discrepancies, the employee may think that overages in the deposits are bet-

In response to requests from dentists for information and resources related to the business aspects of dentistry, a new "Business of Dentistry" section will be featured periodically in JCDA. Similarly, further practice management material will be available on the members' section of CDA's Web site. Send your suggestions for future "Business of Dentistry" topics to: publications@cda-adc.ca.

ter than shortages, but in reality, either of these is a bad sign.

As for vacations, employees who are stealing on a routine basis often volunteer to come in during their time off to perform the deposit. They might need the money to support their lifestyle or they are concerned that another employee will discover and disclose an irregular pattern.

In my experience, I see theft increase during certain time periods. For instance, it often increases just before or after an employee's vacation, because he or she needs to take more money to compensate for the time away from work. I also see more theft prior to or just after Christmas, when extra money is needed to pay the bills.

JCDA: *On a day-to-day basis, what level of suspicion should an employer have toward members of staff? Should the employer operate under the assumption that every employee is a possible offender?*

PJ: I don't think that an owner needs to suspect that staff is always stealing. However, I do believe that you have to perform some checks on a regular basis to keep most employees honest. In other words, don't be so trustful. Some employees will steal simply if there is an opportunity or if there are no controls or procedures in place.

It is often said in our industry that 90% of staff will never steal while the other 10% will. The trick is to keep the 90% honest by continually persuading them not to be dishonest.

JCDA: *What protocols can be implemented at a dental office to avoid or discourage employee theft?*

PJ: Before warning signs or 'red flags' start to appear at your practice, you can introduce a few basic procedures.

All bank deposits should be made the day the deposit is prepared — without exception. The dentist should check the deposit amounts against bank statements on a regular basis. Have these bank statements sent directly to a home address, not the office, to avoid statements being intercepted.

The owner should also know how to check the audit trail on the accounting software or have someone look for entries that have an unusual amount of changes. It is also good business practice to have an outside party handle

Safeguarding Your Dental Practice Against Employee Dishonesty

By Kingsley Butler, CA, president and CEO, CDSPI

In a perfect world, employee dishonesty in a dental practice would never happen. The reported incidents are rare; however, employee theft in the dental practice does occur.

Fortunately, there are accounting and security measures you can take to reduce or eliminate the chances of employee theft. Consider the following recommendations prepared with the assistance of Aviva Insurance Company of Canada, the underwriter of the Canadian Dentists' Insurance Program's TripleGuard™ Insurance Plan.

Cheques: Blank cheques should always be locked in a secure place and made accessible only to signing officers in the practice. Have 2 or 3 signing officers and require 2 of them to sign each cheque. Only accept cheques payable to the practice. Cash and insurance cheques made out to the patient and then endorsed by the patient can be harder to trace.

Financial Duties: Ordering and receiving supplies, depositing funds, preparing invoices and opening mail should be restricted to a small number of trusted employees. The person depositing funds should not be the same person who does monthly bank reconciliations or signs cheques. Ensure that staff members take vacations and, if practical, switch duties among employees periodically.

Audits: Consider having your accountant perform surprise audits whether or not you suspect an employee may be defrauding you. Also schedule annual audits to identify any procedural weaknesses that could leave your practice vulnerable.

Proof: If you discover that an employee has been defrauding you, the insurer will require you to substantiate your loss with documentation such as bank statements and deposit records, accounting ledgers, correspondence and/or forensic accountant's report. So establish good record-keeping practices.

References: Check references thoroughly. In many employee fraud claims, the dishonest employee has previously been suspected of theft by another employer.

Policy: Create a written policy on employee dishonesty at your practice and ensure it is clearly understood by, and consistently applied to, all staff.

To obtain claims assistance for insurance plans you have through the Canadian Dentists' Insurance Program, contact CDSPI's Claim Support Centre at 1-800-561-9401, extension 5015.

the bookkeeping duties for 2 weeks of the year, to identify any unusual patterns or practices.

JCDA: What can a dentist do if he or she suspects an employee of fraud?

PJ: Owners need to be very careful when making a suggestion that an employee might be stealing. They could find themselves on the receiving end of a wrongful dismissal charge or defamation suit, or both.

I recommend that the owner seek professional help. In most of the cases where I have become involved, the owner thought that the theft was for much less dollar value or that a different employee was the one stealing. I would also advise against discussing your suspicions with other employees, because they could be part of the

problem or might inform the suspect without your knowledge.

JCDA: What would be the one piece of advice that you would like the dentists of Canada to take away from this interview?

PJ: That it could happen to them! ♦

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



2006 Canadian Dental Specialties Scientific Session ("CDS3") September 14–16, 2006, Montreal, Quebec Invitation for Case Submissions

Members of the dental specialty community are invited to submit cases for presentation at the 2006 Canadian Dental Specialties Scientific Session (CDS3).

The CDS3 panel are looking for challenging cases, with complete pre- and post-treatment documentation. Ideally, cases should lend themselves to several treatment options in the hopes of fostering discussion, debate and even disagreements!

Submissions must be accompanied with a release form, allowing the material to be used at the conference and for potential publication in *JCDA*.

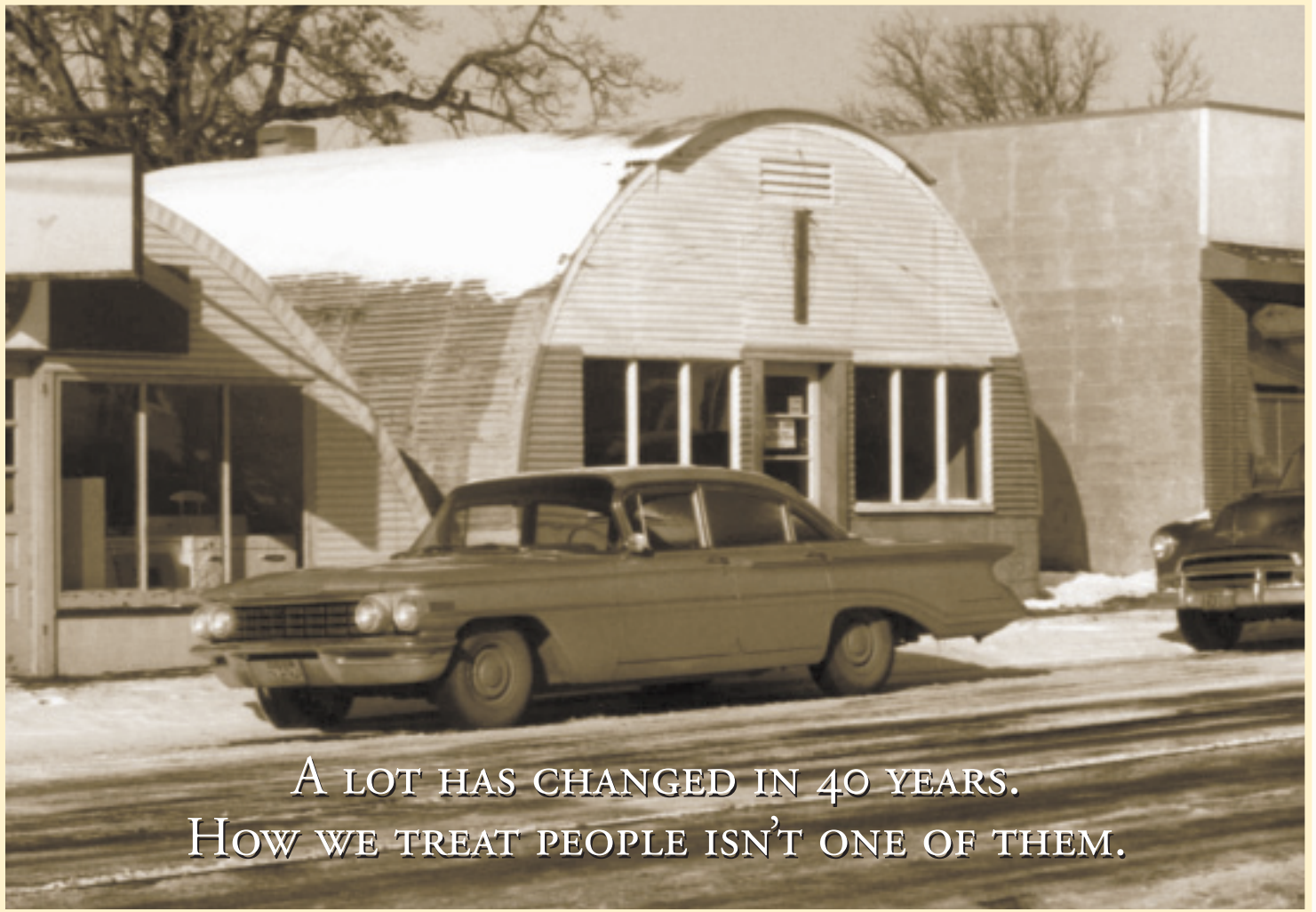
Please send material for consideration by a representative panel to [cgs3@taylorenterprises.com](mailto:cds3@taylorenterprises.com). Submissions must be received by March 1, 2006.

For your reference, case presentations at the Scientific Session will be structured as follows:

1. "Treatment Planning Session: Multidisciplinary Team"
Friday, September 15, 2006 (all day session)
 - A limited number of pre-treatment digital images will be presented to a speaker panel for an "on-the-spot" treatment plan
 - Additional audience input will be solicited, as time permits
 - The treatment rendered will be presented, limited to 5 minutes or less
 - Further panel and audience discussion to follow, as time permits
2. "Endodontics & Restore vs. Extraction & Implant"
Saturday, September 16, 2006 (morning session)
 - Same structure as above, except presentation of the treatment rendered will be limited to 2 minutes or less.

The participating groups at the 2006 CDS3 are the Association of Prosthodontists of Canada, the Canadian Academy of Oral and Maxillofacial Radiology, the Canadian Academy of Paediatric Dentists, the Canadian Association of Orthodontists, the Canadian Academy of Periodontology, the Canadian Association of Public Health Dentists, the Canadian Academy of Endodontists, and the Canadian Academy of Oral and Maxillofacial Pathology and Oral Medicine.

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The “Point of Care” section answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. Readers are encouraged to do more reading on the topics covered. If you would like to submit or answer a question, contact editor-in-chief Dr. John O’Keefe at jokeefe@cda-adc.ca.

QUESTION 1

Is it possible to salvage impacted strategic teeth associated with extensive dentigerous cysts?

Background

Dentigerous cysts constitute the second most common type of jaw cyst, representing 14% to 20% of all jaw cysts.

These cysts are more common in the mandible and occur more frequently in males. They are always radiolucent and are usually unilocular.¹⁻⁵ A dentigerous cyst results from proliferation of reduced enamel epithelium after formation of the enamel and is attached to an impacted tooth; such cysts are often discovered on routine radiographs or when films are obtained to determine why a tooth has failed to erupt.³⁻⁶ Dentigerous cysts are common in children and are easy to treat when small (at which stage they are called eruption cysts) simply by unroofing. However, if the cysts become extensive, they are more difficult to manage. Associated teeth become impacted and may be displaced considerable distances (because of pressure from the cyst). Surgical management may require

the removal of several teeth or tooth buds and may endanger the vitality of adjacent teeth. However, enucleation of the cyst and extraction of associated teeth is often not in the patient’s best interests. In particular, extraction of associated teeth in children may have functional, cosmetic and psychological consequences. The problem of how to replace dentition in growing children is also a concern. For adolescents, we feel that it is often inappropriate to extract affected anterior teeth, since combined surgical and orthodontic treatment can salvage deeply impacted strategic teeth (especially canines) associated with large dentigerous cysts.¹ Aggressive surgery is unnecessary, as recurrence seldom if ever occurs after enucleation.¹⁻⁵ The appropriate mode of treatment must take into account several clinical criteria.

Specific Criteria for Management

Dentigerous cysts block tooth eruption, displace teeth when they become enlarged, destroy bone and encroach on vital structures (e.g., by encompassing or displacing the alveolar nerve or compressing the maxillary antrum).¹⁻⁵ One treatment consists of enucleation of the cyst and extraction of the tooth or teeth embedded in or impacted by the cyst.¹⁻⁷ This approach is favoured in cases involving impaction of a single tooth, such as a wisdom tooth in an adult, which has no function. However, removal of extensive cysts will lead to the loss of several teeth.¹ Conservative methods for eliminating cysts include decompression and marsupialization without removal of associated teeth.¹⁻⁵ Recently defined criteria for selecting the treatment modality (both indications and contraindications) refer to cyst size and site, patient age, the dentition involved and the involvement of vital structures.¹ Enucleation of the cyst without extraction of impacted teeth may be indicated for



Figure 1a: Orthopantomogram of an impacted canine displaced to the inferior border of the chin by a large dentigerous cyst of the mandible extending from the left canine to the right first premolar tooth.



Figure 1b: Lateral cephalogram obtained at the same time.



Figure 2a: Orthopantomogram 5 years after surgery. The tooth has been brought into occlusion after surgical exposure and orthodontic guidance, and the vitality of all of the teeth has been preserved.



Figure 2b: Lateral cephalogram obtained at the same time.

children and adolescents as a means of salvaging the involved dentition if the involved tooth is strategic. For instance, an 11-year-old boy had a swelling in the vestibular area of the left mandibular canine region; several teeth were impacted by a large dentigerous cyst in the symphysis from the right canine tooth to the left premolar (Figs. 1a and 1b). Aspiration of the lesion was performed first; in many cases, such aspiration reveals a clear yellow fluid. Next, the entity must be confirmed by biopsy. In this case, excisional biopsy was performed under local anesthesia via a submarginal mucoperiosteal trapezoid flap reflected from the right canine tooth to the left premolar from under the attached gingiva; the lesion was removed after the cyst had been separated from the bone and incised off the tooth surface with a #15 scalpel. The flap was sewn apically in the vestibule, which left the crown exposed for bracket bonding. Orthodontic treatment was started 2 weeks postoperatively. In most cases, the canine can be brought into occlusion within several years depending on depth of impaction, patient age and other factors (Figs. 2a and 2b).

The capacity to regenerate bone is greater among children than among adults, and teeth with open apices have great eruptive potential. Thus, large dentigerous cysts in children can be treated

differently, and conservative treatment with tooth preservation should be considered. However, the radiographic and clinical findings for dentigerous cysts are not diagnostic, and odontogenic keratocysts, unilocular ameloblastomas, and many other odontogenic and nonodontogenic tumours have similar features; thus, other lesions must be ruled out by histopathologic examination.^{3,5,8,9} If other pathologic entities are reported, the treatment plan may be altered as appropriate for further pertinent treatment. ♦

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QUESTION 2

Some of my patients are still having problems with dentinal hypersensitivity, even after conventional treatment. Are the new oxalate desensitizing agents the answer?

Background

Dentin hypersensitivity, associated with either a restoration or exposure of the root surface, is caused by the rapid movement of fluid in the dentinal tubules. This phenomenon was first described as the hydrodynamic theory of dentinal pain by Brannstrom,¹ who attributed the fluid flow to osmotic stimuli.

It is widely accepted that this rapid flow of fluid creates a pressure change across the dentin, which stimulates the nerve fibres and results in the perception of pain.² It is therefore no surprise that the accepted treatments focus on occluding the dentinal tubules by various precipitates or covering the exposed dentin with an impermeable layer to prevent the osmotic gradient changes that create the painful stimuli.

Many products are available to decrease the sensitivity caused by exposure of the cervical dentin. One category of products consists of desensitizing toothpastes containing potassium nitrate, which penetrates the dentinal tubules and depolarizes the nerves, decreasing the painful stimulus.³ Potassium nitrate gels that can be used in bleaching type trays for hypersensitive root surfaces include UltraEZ (UltraDent, South Jordan, Utah), Den-Mat Desensitize (Den-Mat, Santa Maria,

Calif.) and Relief (Discus, Culver City, Calif.). Another type of product is based on the fact that sclerotic dentin has dentinal tubules that are completely occluded by mineral deposits. To produce a similar clinical situation, fluorides are applied topically, creating precipitates of calcium fluoride, which can close the dentinal tubules.

Products containing glutaraldehyde also work well for desensitization. Glutaraldehyde is an effective disinfectant. It kills bacteria and coagulates the plasma proteins within the dentinal fluids, forming a coagulation plug. Gluma Desensitizer (Heraeus Kulzer, Armonk, N.Y.), 5% glutaraldehyde with 35% hydroxyethylmethacrylate (HEMA) and water, is effective as a desensitizing agent under restorations and does not interfere with the bonding of resins to dentin. However, glutaraldehyde can be irritating to the soft tissues and should be used sparingly; it is applied with a microbrush, and the area is blotted to remove any excess. Hanks and others⁴ reviewed the cytotoxic properties of glutaraldehyde, and Li and others⁵ discussed its mutagenic potential. Like all products containing HEMA, glutaraldehyde can cause contact dermatitis, and it penetrates latex gloves.⁶

By their very nature, the many different types of dentin bonding agents currently available constitute a class of desensitizing agents because they form a hybrid layer. These bonding agents include total-etch 1-bottle and multi-bottle systems, and self etching 1-bottle and 2-bottle systems.

Current Status of Oxalates

Whether used to treat exposed cervical dentin or exposed dentin under a restoration, application of oxalate desensitizing materials to the dentin results in precipitation of potassium oxalate or ferric oxalate crystals. Materials like Protect Drops (John O Butler, Chicago, Ill.) and Sensodyne Sealant (GlaxoSmithKline, Research Triangle Park, N.C.) are designed for application to exposed cervical dentin. Potassium oxalate has been used to occlude open tubules in sensitive cervical dentin, causing "instant sclerosis" of the tubules.⁷

Intended for use under direct and indirect restorations, Super Seal (Phoenix Dental, Fenton, Mich.) is a potassium salt of oxalic acid; combined with water, it creates a calcium oxalate precipitate on the dentin, which affects the bond strength of

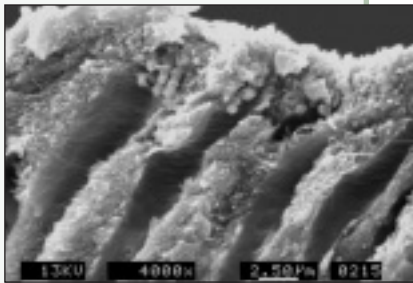


Figure 1: Scanning electron micrograph of typical deposition of oxalate crystals on the dentin surface. Courtesy of Dr. David Pashley.

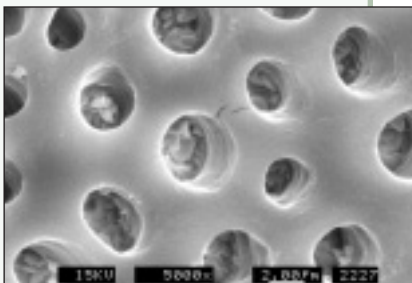


Figure 2: Scanning electron micrograph of oxalate crystals that have precipitated in dentinal tubules. Courtesy of Dr. David Pashley.

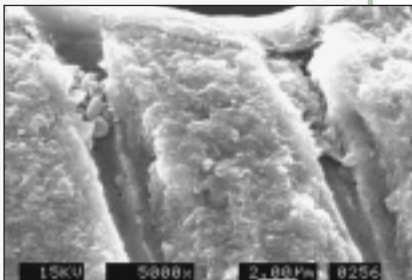


Figure 3: Scanning electron micrograph (lateral view) of dentinal tubules, showing deposition of calcium oxalate crystals. Courtesy of Dr. David Pashley.

Table 1 Shear bond strength of various bonding agents in the presence of BisBlock and Super Seal

Bonding agent	Mean shear bond strength (standard deviation) (MPa)		
	Control	With Bisblock	With Super Seal
One-Step	21.77 (0.49)	23.06 (3.80)	23.14 (1.59)
Single Bond	22.64 (1.61)	22.38 (2.96)	11.34 (6.02)
Solo Plus	20.04 (2.23)	10.60 (3.67)	7.30 (2.25)
Prime Bond NT	14.96 (5.44)	7.30 (2.87)	8.64 (5.52)
Excite	17.99 (1.03)	7.38 (3.35)	3.82 (3.89)
All-Bond 2	23.59 (2.95)	20.57 (3.19)	9.54 (4.71)

Single Bond (3M ESPE, St. Paul, Minn.); Excite (Ivoclar Vivadent, Amherst, N.Y.); All-Bond 2 (Bisco)

any dentin bonding agents used over it. With OptiBond Solo Plus (sds/Kerr, Orange, Calif.) and Prime & Bond NT (Dentsply), bond strength was much lower than with a control agent.⁸ In their newsletter,⁹ Clinical Research Associates, Inc. reported that “Super Seal reduced bond strengths significantly for 5 out of the 6 adhesives tested.” In contrast, BisBlock (Bisco, Schaumburg, Ill.) oxalate desensitizer uses a unique patented approach for sealing the dentinal tubules,¹⁰ whereby the dentin is etched before application of the oxalate. Removal of calcium from the reactive surface creates a preferential deposition zone for the calcium oxalate crystals within the dentinal tubules, not on the dentinal surface (Figs. 1 to 3). When BisBlock is applied to the root surface, this deposition within the tubules prevents dislodgement caused by toothbrush abrasion.

It is of utmost importance to remember that many desensitizing agents affect the bond strength of the adhesives that we use every day. Specifically, oxalate desensitizers yield low bond strengths when used with low pH (highly acidic) adhesives. Table 1 shows that not all total-etch adhesives are compatible with oxalate desensitizers. For example, only One-Step (Bisco) is universal, working equally well with both BisBlock and Super Seal. ➤

THE AUTHOR



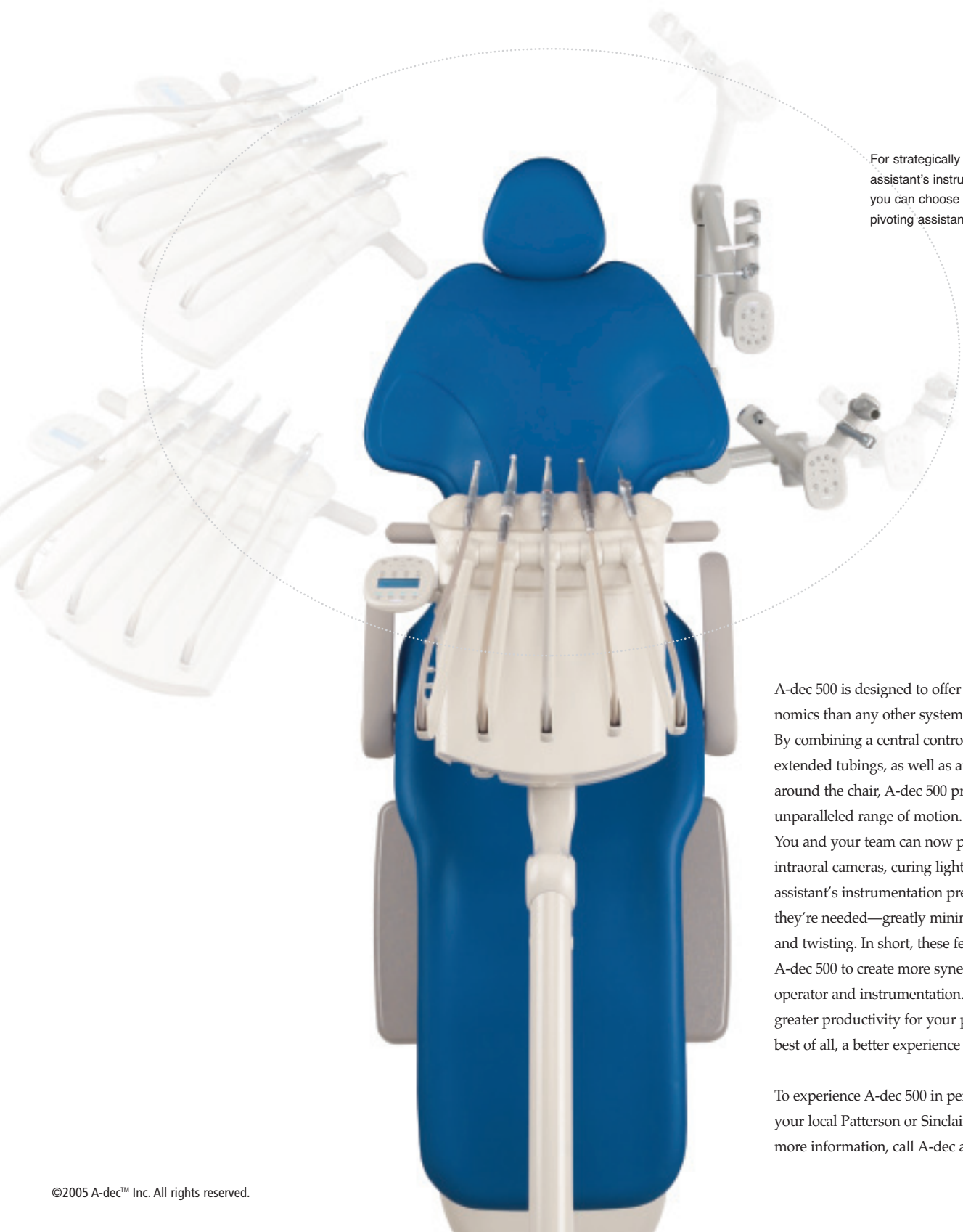
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QUESTION 3

What can I do for a patient who is taking bisphosphonates and who has an area of exposed bone in the oral cavity that will not heal?

Background

Bisphosphonates are synthetic analogues of inorganic pyrophosphate with a high affinity for calcium. They are rapidly cleared from the circulation, binding to bone mineral and thus selectively concentrating in bone. Bisphosphonates are potent inhibitors of osteoclastic activity, particularly when administered intravenously.¹ In addition, they have anti-angiogenic properties, reduce mineral loss in metastatic bone lesions and may be tumoricidal,² which makes them important agents in cancer therapy.¹⁻³

Bisphosphonates constitute an important class of medications used to treat osteoporosis (for which they are often administered orally), Paget's disease of bone, primary lesions due to bone cancer, advanced cancer (specifically breast, lung and prostate) with metastasis to bone, and hypercalcemia due to malignancy (for all of which they are administered intravenously).^{1,3} The complication of an oral area of bone that will not heal has been termed "bisphosphonate-associated osteonecrosis" (BON). The most common IV bisphosphonates associated with BON are pamidronate (e.g., Aredia, Novartis Pharmaceuticals, Dorval, Quebec) and zoledronic acid (e.g., Zometa, Novartis Pharmaceuticals). Recently, cases of delayed healing or absence of healing after dental extraction have been reported in patients with cancer who were receiving injectable bisphosphonates; spontaneous lesions in the jaw have also been reported.^{4,5} BON has been reported among patients taking oral alendronate (e.g., Fosamax, Merck Frosst, Kirkland,

Quebec) to treat osteoporosis or osteopenia. The common link in all of the reported cases was the use of bisphosphonates for the treatment of cancer; some of the patients were also being treated with steroids.⁵

Although the exact mechanism leading to BON has not been confirmed, it is known that bisphosphonates potently inhibit osteoclastic activity, increase mineralization of bone and reduce the vascularity of bone, all of which result in reduced repair and remodelling potential. The bone may become highly mineralized and dense and may be unable to meet the demands of remodelling associated with trauma, which ultimately leads to necrosis. Trauma associated with dental extractions, ill-fitting prosthodontic appliances, periodontal and dental disease, and systemic factors (e.g., oral infections, poor oral health and medical compromise) may increase the risk of BON. Spontaneous oral complications have been reported, and although the lesion may be asymptomatic, most common initial complaints can include intraoral pain and the presence of roughness because of exposed bone.

Clinical Presentation

Patients usually present asymptotically, but there may be pain in the maxilla and/or the mandible; secondary infection may occur when the necrotic bone is exposed to the oral environment. The osteonecrosis is often progressive and may lead to extensive areas of bone exposure, dehiscence or sequestration. If secondary infection occurs, the patient may complain of severe pain, bad taste in the mouth, bad breath and paresthesia, which may indicate compression of a peripheral nerve. The history most commonly associated with this process is delay in or absence of healing after trauma. There are no radiographic manifestations in the early stages. The diagnosis of BON is based on a thorough medical, dental and pharmacological history, as well as a complete clinical examination. The exposed bone may become hydrated through exposure to saliva and may be elevated above the contours of the adjacent normal bone (Figs. 1 and 2).



Figure 1: Exposure of the bone on the lingual aspect of the mandible, with elevation of the bone contours above the height of the gingival tissue and no sign of clinical infection.

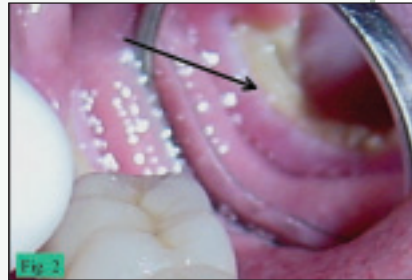


Figure 2: Exposed bone on the buccal aspect of the retromolar pad, with elevation of bony contours and no clinical signs of secondary infection.

Management

Definitive guidelines for the diagnosis and management of BON have not yet been established, but current guidelines are based on those for osteonecrosis after radiation therapy. The ideal approach is preventive and consists of eliminating all potential sites of infection and trauma before bisphosphonate therapy is initiated. Thus, dental preventive measures should be in place before bisphosphonates are prescribed and should be reinforced at regular dental visits.

For patients who have been on IV bisphosphonate therapy for less than 3 months, a similar preventive strategy may be employed. However, if a patient has been receiving therapy for more than 3 months and dental treatment is required, the following approach is appropriate:

1. Routine dental care may be performed, with limited use of vasoconstrictors.
2. Grossly carious teeth should be treated endodontically. Extractions should be avoided if possible.
3. Periodontal procedures should be performed atraumatically.
4. Multiple dental extractions should be avoided; if needed, an atraumatic approach, such as sectioning multirooted teeth, should be undertaken.
5. Areas of BON with sharp edges of bone should be recontoured to reduce trauma to soft tissues (if this area is secondarily infected, antibiotics should be prescribed).
6. Prosthodontic appliances must have good fit and function.
7. Referral to providers experienced in the treatment of osteonecrosis and consultation with the patient's medical oncologist are suggested.
8. To date, there is no evidence to support discontinuation of bisphosphonate therapy to promote healing of necrotic bone.

9. While hyperbaric oxygen therapy is considered for postradiation osteonecrosis, its use for BON remains to be established.

Conclusion

Dental professionals must be involved in the prevention of BON by providing excellent preventive and regular supportive care. ♦

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QUESTION 4

Why do some patients complain of a toothache long after a successful endodontic procedure?

Background

Dentists are routinely asked to diagnose and treat pain of presumed dental origin. Orofacial pain is typically of dental origin and can usually be resolved by one or more dental treatments, including nonsurgical and surgical endodontic procedures. However, some patients continue to report pain in the teeth or adjacent areas, even when clinical and radiographic criteria for successful treatment have been met. Most of these patients have what is known as neuropathic pain. This condition presents a significant challenge to dentists, particularly endodontists, who are often asked to treat such patients.

Epidemiological Studies

Only limited epidemiological studies are available on the prevalence of chronic neuropathic pain after an endodontic procedure. Marbach and others¹ conducted a survey of patients followed by clinical and radiographic examination of female patients who continued to report tooth pain more than 1 month after nonsurgical endodontic treatment and found that about 3% (8/256) of the female patients fulfilled

their criteria for continuous neuropathic pain. Campbell and others,² following a similar protocol with patients who had previously undergone surgical endodontic treatment, found that 5% (6/118) of the patients reported ongoing pain after surgery (average time of assessment 21 months after the procedure). In a recent study by Polycarpou and others,³ patients from a tertiary referral centre were examined clinically and radiographically 12 to 59 months after undergoing nonsurgical or surgical endodontic treatment; 12% (21/175) of the patients had persistent pain in the absence of clinical or radiographic signs of dental disease.

Neuropathic Pain in the Context of Dental Treatment

In studies by various authors,¹⁻⁶ most patients with continuous neuropathic pain related the onset of their pain to some form of dental treatment, a dental infection or dental trauma. In addition, patients who continued to seek invasive dental treatment did not experience any pain relief, and some patients had more pain after these procedures.

Table 1 Medications used in the management of neuropathic pain

Therapeutic Class	Drugs
Antidepressants	
• Tricyclic antidepressants	Amitriptyline, desipramine, doxepin, imipramine, nortriptyline
• Serotonin and norepinephrine reuptake inhibitors	Duloxetine, venlafaxine
Anticonvulsants	Carbamazepine, gabapentin, lamotrigine, levetiracetam, oxcarbazepine, phenytoin, tiagabine, topiramate, valproic acid, zonisamide
Benzodiazepines	Clonazepam
Anti-arrhythmics	Mexiletine
Analgesics	Acetaminophen, COX-2 inhibitors, NSAIDs, opioids, tramadol
NMDA antagonists	Amantadine, dextromethorphan, ketamine, memantine
Topical formulations	Capsaicin, clonidine, lidocaine
Others	Baclofen, tizanidine

NSAID = nonsteroidal anti-inflammatory drug, COX-2 = cyclooxygenase 2, NMDA = N-methyl-D-aspartate

Deafferentation Pain

The pain that these patients experience may be due to deafferentation of the trigeminal nerve (cranial nerve V). Deafferentation is defined as the cutting or crushing of a peripheral nerve. The pain associated with deafferentation is similar to the pain described by amputees, who may experience unusual sensation or pain around the site of an amputation or peripheral to the site (known as phantom limb pain). Complex peripheral and central mechanisms are involved in the initiation and maintenance of neuropathic pain. The primary mechanism involves the release of chemicals from the peripheral tissues or primary afferent nerve endings as a result of tissue injury or inflammation. These chemicals can increase the excitability and decrease the activation threshold of peripheral nociceptors (a process known as peripheral sensitization), which in turn increases nociceptive input to the central nervous system. This bombardment of input induces spontaneous activity, expansion of receptive fields, lowering of activation thresholds and hyperexcitability of neurons in the central nervous system (central sensitization). An experimental animal model developed at the University of Toronto for assessing single-nerve injury after endodontic procedures (nerve amputation) has given us much insight into the mechanisms of neuropathic pain.⁷

Diagnostic Considerations

Diagnosis should begin with a comprehensive history as well as clinical and radiographic examination. A differential diagnosis should be established to rule out pain of dental, soft tissue or pathological (peripheral or central) origin. Once the diagnosis of neuropathic pain is established, no further dental procedures should be performed unless specific findings of dental pathosis are identified. Otherwise, ineffective or inappropriate treatment may be rendered. The practitioner must then choose to initiate some form of treatment or refer the patient to a practitioner with a more comprehensive understanding of these neuropathic conditions.

Management of the Problem

Current treatment modalities often require a multidisciplinary approach. Pharmacological management, often the treatment of choice, involves the use of peripheral and/or centrally acting medications (Table 1). Psychological counselling may also be considered. Practitioners who treat neuropathic pain include those with

backgrounds in oral medicine and orofacial pain, pain medicine and management, and behavioural medicine.

Conclusions

All dental practitioners need to understand the concept of neuropathic pain and should be able to recognize the condition. However, the management of neuropathic pain requires a nonsurgical and pharmacological approach that may be beyond the training and experience of dental practitioners who are accustomed to treating acute pain. It is only with this awareness that appropriate and effective care can be delivered to patients with this type of pain. ♦

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The authors have no declared financial interests.

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The Reference Guide: A Step-by-Step Technique for Restoration of Fractured Anterior Permanent Teeth

Márcia Pereira Alves dos Santos, DDS; Lucianne Cople Maia, DDS, MSD, PhD

“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.

Dental trauma in children, caused mainly by falls during recreational and sporting activities, as well as car crashes and acts of violence,¹ can be regarded as a public health issue.² Greater-than-normal dental overjet and inadequate lip coverage are predisposing factors.³ The most common consequence of hard-tissue trauma is uncomplicated crown fracture,⁴ and among children 6 to 15 years of age the incidence of this type of trauma ranges from 15% to 79.6%.^{2,3,5,6} The central superior incisors are the most vulnerable teeth,^{2,3,5-7} especially among boys.^{8,9}

The main techniques for reconstructing fractured teeth include the use of direct adhesive restorative materials. However, this type of treatment is time consuming and requires a skilled operator who has complete mastery of the restorative mate-

rials. An alternative to the direct restorative technique is the use of a reference guide.

This paper offers a step-by-step description, based on a specific case study, of a reference guide technique for restoration of permanent superior incisors fractured through trauma.

Case Study

A 9-year-old girl, accompanied by her guardian, attended the odonto-pediatrics clinic with esthetic concerns related to dental fractures caused by a fall from a bicycle.

Other aspects of the patient’s medical history did not reveal anything of relevance.

An oral examination showed that oral hygiene was good and caries were absent. The patient had Class II molar relation, an anterior open bite and overjet of 4 mm,



Figure 1: Frontal view of uncomplicated crown fractures of teeth 11 and 21 (horizontal and oblique fractures of the enamel and dentin).



Figure 2: Occlusal view of the crown fractures.



Figure 3: Initial periapical radiograph shows no pathological conditions in the pulpal or periodontal tissues of the fractured teeth.



Figure 4: A model was constructed with an alginate mould during the first consultation.



Figure 5: The model was waxed to rebuild the size and shape of the fractured teeth.



Figure 6: The model was moulded with a heavy silicon base to obtain the reference guide.

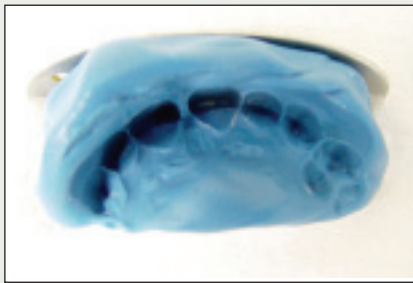


Figure 7: Occlusal view of the reference guide.



Figure 8: Selection of restorative material (l. to r.: A3 TPH Spectrum, Dentsply; A2 Durafill and Charisma, Kulzer).



Figure 9: Selection of colour by means of a mockup selection system.



Figure 10: The reference guide was divided into 2 halves, vestibular and palatal.



Figure 11: The palatal portion of the reference guide was fitted to the palatal surface of the teeth, to serve as the matrix.



Figure 12: Pumice stone and water were used to remove dental plaque.

and uncomplicated horizontal and oblique crown fractures in teeth 11 and 21 (Figs. 1 and 2). A periapical radiograph (Fig. 3) revealed no pulpal and radicular involvement. Therefore, the clinician chose to use a reference guide restorative technique.

A model was constructed (Fig. 4) in which the fractured teeth would be reconstructed by means of progressive waxing (Fig. 5). After that, another mould with a heavy silicon base was made (Fig. 6), reproducing the shape and contour of the needed restorations (Fig. 7). The

restorative material and colour were selected (using a mockup colour selection system) (Figs. 8 and 9) and noted in the patient's record.

During the next session, the mould of the reconstructed teeth was cut into 2 halves (Fig. 10). The palatal portion of the mould fit perfectly the palatal aspect of the teeth to be reconstructed, thus serving as a reference guide (Fig. 11).

Total isolation of the teeth was followed by treatment with pumice stone and water to remove plaque (Fig. 12). The area was then



Figure 13: After etching conditioning with 35% phosphoric acid, the bonding system was applied according to the manufacturer's instructions.

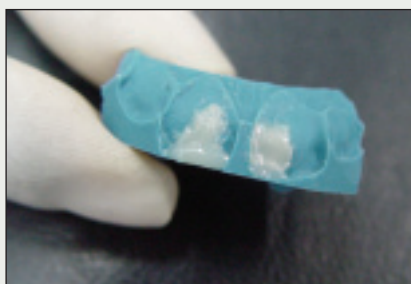


Figure 14: Restorative material was applied on the palatal portion of the reference guide.



Figure 15: The guide and the restorative material were adapted on the palatal face of the teeth.



Figure 16: The initial palatal portion of the restoration was easily created after the photopolymerization.



Figure 17: The crown was reconstructed in 2 incremental layers using a restorative technique.



Figure 18: Final view of the restoration after 3 months.

washed with a physiological solution; there was no cavity preparation. The adhesive protocol was performed according to the manufacturer's specifications (Fig. 13). A3 TPH Spectrum restorative material (Caulk Dentsply, Konstanz, Germany) was applied to the palatal portion of the reference guide (Fig. 14), and incisal Charisma restorative material (Kulzer, Hanau, Germany) was applied to the incisal portion. The reference guide was then fitted to the palatal surface of the teeth (Fig. 15), and photopolymerization was applied for 40 seconds (Fig. 16). A2 Durafill VS restorative material (Kulzer) was used for restoring the vestibular surface (Fig. 17). Finishing, polishing and adjustments were performed with a scalpel blade, multilaminated drills, abrasive straps and polishing paper disks.

The patient and guardian received instruction on postoperative care and were alerted to the importance of using a mouthguard and the need for orthodontic treatment. The first follow-up appointment took place 3 months later

(Fig. 18), and subsequent follow-up will occur at yearly intervals.

Discussion

Direct adhesive restorations are commonly used for the reconstruction of uncomplicated crown fractures, as in the case of fracture of the enamel and dentin without pulpal involvement.^{2,3,5} However, the ideal for this type of reconstruction is to reattach the dental fragment by bonding. In the case presented here, the patient no longer had the dental fragments, and the dentist had to reconstruct the fractured area with composite resin. The patient had 2 teeth that needed restoration, so a reference guide technique was used to ensure optimal outcome.

The restorative technique used in this study facilitates the reconstruction of fractured anterior teeth. A reference guide is created from the teeth (as reconstructed in a model), which makes it possible for the clinician to increase the chance of success by planning the procedure in detail. The size, shape, inclination and colour of

the teeth are determined in advance, which reduces the need for eventual adjustments. Another advantage is that the restorative procedure can be carried out in 2 short clinical sessions, with a drastic reduction in chair time; this factor is important to ensure the child's cooperation. In addition, use of a reference guide makes it possible for 2 or more teeth to be restored simultaneously; in contrast, with the conventional technique, the second restorative procedure can begin only when the first one is complete (to guarantee total recovery of the contact point). Besides functioning as a matrix for reconstructing the anatomy of the teeth, the reference guide functions as a baffle plate to hold the restorative material, facilitating its insertion into the area to be reconstructed. The method does have limitations, however: moulds are needed, and progressive waxing of the fractured teeth must be performed, which demands additional materials and steps not directly related to the creation of the direct adhesive restorations. ♦

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Preventive and Interceptive Orthodontic Treatment Needs of an Inner-City Group of 6- and 9-Year-Old Canadian Children

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Abridged Version

The complete article can be viewed on the eJCDA Web site at www.cda-adc.ca/jcda/vol-71/issue-9/649.html

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Early recognition of developing malocclusions and the potential for uncomplicated orthodontic treatment procedures can minimize or eliminate future costly treatment.

Objective: This study was designed to assess the potential for a preventive orthodontic approach in children living in a limited-income environment. A modified index for preventive and interceptive orthodontic needs (IPION) was used to determine the need for such treatment in schoolchildren aged 6 and 9 years.

Methods: A total of 395 children were examined by 2 calibrated examiners. These children were divided into 2 groups, aged 6 and 9 years. Informed consent

was obtained and all children present at school on the day of the field study were included. Each child was assessed independently and several components of his or her occlusion were recorded, including molar relationship, crossbite, open bite, overbite and overjet, as well as dental variables such as presence of caries and early loss of teeth. All traits were given a score using the criteria set by the IPION. Trait scores were then

added to yield a total score, which indicates the need for preventive or interceptive orthodontic treatment.

Results: A high prevalence of caries in the deciduous dentition (30.4% for 6 year olds; 20.6% for 9 year olds) and early loss of primary teeth (11.9% for 6 year olds; 29.4% for 9 year olds) was observed. Significant overjet (≥ 5 mm) was noted in 11.2% of 6 year olds and 17.5% of 9 year olds. Deep overbites

(\geq two-thirds of lower incisor covered) were also found in 24.1% of the 6 year olds and 23.2% of 9 year olds. Crossbites were more common in the anterior segment than the posterior segment for both groups. In the 6-year-old group, 10.5% exhibited some form of anterior crossbite; in the 9-year-old group, the proportion was 11.9%. Posterior crossbites occurred in 3.0% of the 6-year-old children, but 7.8% of the 9-year-old group. An anterior open bite was found in 10.0% of the 6 year olds and 6.7% of the 9 year olds. Most of the children scored between 1 and 4 on the IPION, but this proportion was higher for the 6 year olds (61.7%) than the 9 year olds (55.7%). Future orthodontic problems were identified in 20.9% of the 6 year olds and 37.0% of the 9 year olds. No statistically significant differences ($p > 0.05$) were found between sexes or age groups using the χ^2 test.

Discussion: Preventive and interceptive orthodontics carried out by a general dentist, as opposed to a specialist orthodontist, can potentially eliminate the need for, or reduce the cost of, future extensive orthodontic treatment. Patient education, fluoride treatment, sealants, regular screenings and basic restorative work can enhance the preventive orthodontic approach. Also, important interceptive orthodontic work can be accomplished with relatively inexpensive removable appliances, such as expansion appliances, habit-breaking appliances, space maintainers and crossbite correction appliances. Most developing malocclusions identified in this study would be amenable to interceptive orthodontics. ♦

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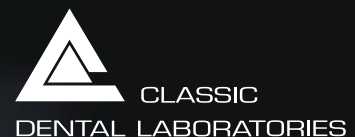
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Introducing Digital Radiography in the Dental Office: An Overview

C. Grace Petrikowski, DDS, MSc, FRCD(C)

Abridged Version

The complete article can be viewed on the eJCDA Web site at www.cda-adc.ca/jcda/vol-71/issue-9/651.html

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Digital radiography (DR) is gaining in popularity and many dentists are considering changing from a film-based system to this new technology. Dentists must clearly define their objectives for adopting digital radiography and be aware of the problems that may be encountered with this equipment, so that they can make an informed purchasing decision.

Information on DR equipment is available from many sources, including dental journals, the Internet and sales representatives.

Although most dentists will agree that DR has many distinct advantages over a film-based system, many are reluctant to make the change because they are unsure of what to expect during the change-over period and what type of problems they may encounter. This article provides an overview of digital radiographic equipment, experiences users have had with this technology

and factors to consider when deciding to purchase a DR system.

In digital radiography, conventional film is replaced by an image receptor. Two major types of systems are available: "instant image" systems (charge-coupled device [CCD] or complementary metal oxide semiconductor active pixel sensor [CMOS-APS]); and storage phosphor (SP) systems, which have an intermediate scanning step. Both types of receptors yield diagnostically acceptable images, but each has distinct advantages and disadvantages, which may make one or the other more suitable for a particular situation. Aside from the image receptor, users may have to purchase an additional computer and monitor, a printer

suitable for printing photographic images and accessories for the DR equipment, such as infection control sleeves or pouches and positioning devices.

Technical problems encountered by users may be related to the computer or to the DR equipment itself. Reports of computer problems include hardware, software, networking problems or a combination of the three. Ease of use of DR systems varies depending on operator experience and patient factors.

Before deciding to purchase DR equipment, it is important for dentists to list their objectives for using DR, then ask themselves if use of the system will realistically fulfill all their objectives. Some of the typical objectives given for using DR include: elimination of chemical processing, time savings, reduction in radiation dose to patients, patients' perception of the office as "modern" or "state of the art," ability to integrate radiographic images with digital camera images for patient education and presentation of the treatment plan and the hope for improved diagnostic accuracy.

DR is an excellent alternative to film-based radiography and is convenient to use. Diagnostic accuracy using DR is equally as good as with film in most cases and disadvantages associated with earlier types of equipment have been resolved with advances in technology. However, regardless of the type of system purchased, users should expect some technical problems and the need for future upgrades of hardware (computer and DR equipment) and software. With careful purchase planning and realistic expectations, users will avoid disappointment in system performance. ❖

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The Use of Lasers for Periodontal Debridement: Marketing Tool or Proven Therapy?

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ABSTRACT

The use of lasers in dentistry has recently received much attention, in both clinical practice and research; their unique properties produce favourable clinical results in some cases and encourage patient acceptance. Various types of lasers have been investigated as an adjunct to periodontal therapy; these include carbon dioxide (CO₂), diode, neodymium:yttrium–aluminium–garnet (Nd:YAG) and erbium:yttrium–aluminium–garnet (Er:YAG) lasers. However, adverse results have been associated with each type, including thermal damage to root surfaces, increases in pulpal temperature and the production of toxic by-products. The Er:YAG laser has produced the most promising results, as it can ablate effectively with minimal adverse effects. More research is needed to determine the ideal settings and methods for using the laser safely and effectively in clinical practice.

MeSH Key Words: debridement/methods; laser surgery/methods; periodontal diseases

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The concept of lasers dates back to 1917 with Einstein's theory of stimulated emission, but it was not until 1960 that the first working laser was created by Theodore Maiman.¹ Lasers are currently used in a wide range of medical and cosmetic procedures including cataract surgery² and hair removal.³ However, they have only recently received attention in clinical dental settings. Lasers are being recognized for their ability to ablate hard tissues with minimal anesthesia,^{4,5} reduce bacteria counts in root canals^{6,7} and even provide hemostasis of soft tissues during their use.⁸ The aim of this article is to review various studies of lasers used in periodontal debridement.

Lasers and Clinical Dentistry

The word "laser" is an acronym for "light amplification by stimulated emission of radiation." Lasers are categorized according to the medium used to provide atoms to the emitting system. Each type of atom can absorb photons of only certain wavelengths; therefore, each medium will produce a laser beam with a specific range of wavelengths.⁹ Light of different wavelengths will interact differently

with tissue and has different adsorption qualities. Lasers used in dentistry emit wavelengths between 377 nm and 10.6 μm. The most common types are carbon dioxide (CO₂), diode, neodymium:yttrium–aluminium–garnet (Nd:YAG) and erbium:yttrium–aluminium–garnet (Er:YAG) lasers. They are currently used for cavity preparation,⁴ tooth whitening,¹⁰ gingival incisions¹¹ and other applications. In periodontics, lasers have been investigated for use in promoting periodontal attachment,¹² elimination of bacteria from periodontal pockets,⁶ debridement of root surfaces¹³ and treatment of dentinal hypersensitivity.¹⁴

Carbon Dioxide Laser

The CO₂ laser has the longest wavelength of all dental lasers (10.6 μm). Compared with other lasers, such as the Er:YAG, its absorption coefficient in hydroxyapatite is very high (10⁴), but the absorption coefficient in water is low (10³) (Fig. 1),¹⁵ accounting for the powerful ablative properties of this laser.

Almost all studies of CO₂ lasers for periodontal debridement are in vitro; information from clinical settings is limited. All in vitro

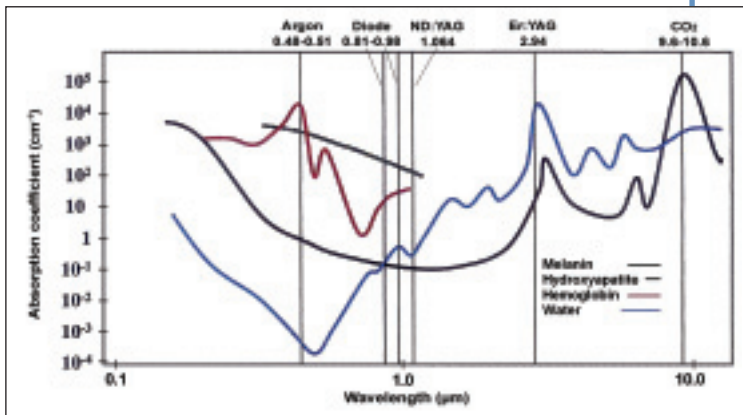


Figure 1: Absorption coefficients and wavelengths of various lasers. Note the significant differences between short and long wavelength lasers. Reprinted with permission from the Institute of Laser Dentistry.

studies noted similar effects on the root surfaces of extracted teeth, i.e., charring, cratering, carbonization, surface cracking, meltdown and resolidification of minerals like calculus.¹⁶ The use of a coolant had no effect.^{15,17,18} Less aggressive results have been reported when a pulsed defocused beam was used, but this resulted in non-favourable morphologic changes in the tooth surface.¹⁹

One of the problems associated with the use of a CO₂ laser is the estimated depth of laser energy penetration into the calculus masses. In vivo, microbial plaque thickens to 100 μm within hours of colonization. Complete eradication of such a thick layer would require a penetrating wavelength with higher energy density or longer and more repeated exposures, which would lead to increased risk of damage to the adjacent tissues.¹⁶

There is also evidence that CO₂ lasers may produce toxic substances by photothermal vaporization. The high absorption of CO₂ laser energy by hydroxyapatite results in transformation of some of the radiant energy into heat, increasing the local temperature to over 700°C, which is sufficient to melt hydroxyapatite, and resulting in the emission of cyanate and cyanamide — both toxic substances.¹⁵

In vivo, CO₂ laser treatment had no significant long-term effect on levels of *Porphyromonas gingivalis*, interleukin-1 beta (IL-1β) or gingival crevicular fluid (GCF) and actually led to an increase in IL-1β.²⁰ In this study, probing depths at 12 weeks had decreased after CO₂ laser treatment although less than that observed after Nd:YAG laser treatment and ultrasonic scaling. Improvements in clinical attachment levels were only significant in the latter 2 groups.

Diode Laser

Surgical diode lasers emit coherent, monochromatic light of short wavelength. The shorter wavelength results in a small absorption coefficient in water and hydroxyapatite; therefore, diode lasers do not ablate hard tissues very well due to their weak interaction with mineralized structures. However, this wavelength results in a high absorption coefficient in dark media such as hemoglobin, making diode lasers excellent for surgical cutting in well-vascularized soft tissues.²¹ The procedure results in coagulation and minimal bleeding when used on gingiva.

In vitro studies testing the efficiency of the diode laser in periodontal debridement have been carried out using several models: the 665-nm AlGeAs (aluminium–germanium–arsenide) laser,²² the 810-nm GaAlAs (gallium–aluminium–arsenide) laser,^{22,23} the 655-nm GaAlAs laser¹² and a 980-nm diode laser.²⁴ In all of these studies, there were minimal thermal increases over the 5°C accepted limit. The bactericidal effect of these lasers depended on species of bacterium, wavelength and dose.¹² The in vitro removal of calculus using a diode laser seemed to be consistent and comparable with manual scaling and root planing (SRP).^{12,22–24}

In in vivo studies with diode lasers, large amounts of calculus remained after treatment and there was significant structural damage to root surfaces.¹² Yilmaz and others²⁵ used a GaAlAs laser in a randomized controlled trial and found no beneficial effect over SRP alone. The differences between in vitro and in vivo studies may be attributed to the presence of blood in vivo, which may influence the amount of fluorescence radiation reaching the calculus.

Although diode lasers are currently being investigated in other aspects of dentistry, including treatment of peri-implantitis, they do not seem to provide any advantages over SRP in periodontal debridement. However, as this is a soft tissue laser, it may have potential as an adjunct to classical periodontal debridement rather than as monotherapy. Romanos and others²⁴ found the 980-nm laser to be superior to SRP in removing thin pocket epithelium. More research is needed in this area.

Neodymium:Yttrium–Aluminium–Garnet Laser

Nd:YAG lasers have a slightly longer wavelength (1,064 nm) than diode lasers. Although their absorption by healthy human enamel is very low, their much greater absorption by carious enamel makes them worthy of investigation.²⁶ The Nd:YAG laser has been tested in periodontal therapy since the early 1990s.^{27–29}

Table 1 Summary of in vitro studies of the erbium:yttrium-aluminium-garnet laser

Authors	Outcome measures	Sample size	Water coolant	Controls	Random	Pulses/s	Tip size	Energy output; mJ/pulse	Results
Aoki and others ⁴²	SEM observation of effect of laser in calculus removal SEM observation of root and thermal effects of laser with and without water coolant	53	Yes Yes	No	Yes	10 (200 µs)	600-µm diameter	10, 20, 30, 50, 80, 120	Ablated calculus and underlying cementum and dentin Maximum calculus selectivity at 30 mJ/pulse Fewer thermal effects with water irrigation Minimal rises in pulpal temperature
Gašpirc and others ³²	Morphology, chemical structure and diffusion processes of root surface	60	No	Yes	Yes	10 (250 µs)	—	60, 80, 100	Cementum and dentin removed without thermal side effects Chemical structure of root surface maintained Diffusion process increased more than with Nd:YAG laser
Frentzen and others ⁴¹	SEM and light microscopic examination of root surface characteristics and calculus removal	40	Yes	Yes	Yes	—	1.10 × 5, 1.65 × 5 mm	160	Adequate calculus removal, roughened surfaces and increased cementum removal compared with SRP Crater depths within range of those with SRP and ultrasonics
Aoki and others ⁴⁷	Histologic/SEM observation of root surface and efficiency of scaling Thermal changes	53	Yes	Yes	Yes	10 (200 µs)	600-µm diameter	40	Lower level of vibration than with ultrasonic debridement No major thermal damage Rougher root appearance than with ultrasonic debridement Settings not selective enough for calculus removal without root damage
Folwaczny and others ⁴³	SEM examination of root surface Evaluation of substance removal (calculus and root surface)	50	No	Yes	Yes	15 (250 ns)	1.65 × 0.5 mm	60, 80, 100, 150	Significantly more substance removal than controls at all energy levels No residual deposits or smear layer formation and no thermal side-effects

Nd:YAG = neodymium:yttrium-aluminium-garnet; SEM = scanning electron microscopy; SRP = scaling and root planing.

Several in vitro studies have used scanning electron microscopy to investigate the effects of Nd:YAG lasers on root surfaces.^{17,30–32} Most of these studies used a pulsed laser beam with a contact optical fibre, except for that of Wilder-Smith and colleagues,³¹ who positioned the tip of the laser 5 mm from the root surface. All 4 studies found that the Nd:YAG laser had a detrimental effect on the root surface; damage ranged from heat cracking to charring, cementum meltdown and crater formation. Although surface cooling with water, air or both decreased the damage, a 25% to 40% increase in laser energy density was needed to produce equivalent ablation effects.¹⁷

Cytokines, such as IL-1β, have been implicated in the pathogenesis of various forms of periodontal disease. Endotoxin seems to be the most potent stimulator of IL-1β production. Therefore, it seems only natural to target the removal of cementum-bound endotoxin during root planing. Liu and others³³ examined the effect of Nd:YAG lasers on endotoxin in teeth extracted due to periodontal disease. They found that the laser alone could not produce a high enough temperature to destroy cementum-bound endotoxin and still remain within safe clinical limits. SRP alone or combined with laser treatment produced similar outcomes in terms of the reduction of

IL-1β for up to 3 months.³⁴ In a comparison of Nd:YAG laser monotherapy in vivo versus ultrasonic scaling, probing depth reduction and attachment levels observed at 3 months were also similar.²⁰

After observing positive results, investigators^{8,35} suggested that perhaps the Nd:YAG laser should be used as an adjunct to SRP to perform sulcular debridement rather than to remove calculus. Its role would focus on the elimination of bacterially infested pocket epithelium rather than actual calculus ablation. As pocket epithelium in a diseased environment consists of significant granulation tissue (which is a dark colour due to dilated blood vessels), the laser could stimulate evaporation of the darker tissue thus reducing periodontal pathogens and prolonging their recolonization time. The tip of the optical fibre would be brushed over the treatment area allowing light contact with the pocket epithelium for the necessary amount of time. After treating and monitoring 744 periodontal pockets (pocket depth > 4 mm), Neill and Mellonig³⁶ found that SRP alone and SRP plus Nd:YAG laser treatment produced a pocket depth reduction of 1.6 mm and 1.7 mm, respectively, which was maintained at 3 months. Clinical attachment levels and microbial counts also showed similar improvement with

Table 2 Summary of in vivo studies of the erbium:yttrium-aluminium-garnet laser

Authors	Outcome measures	Sample size	Water coolant	Controls	Random	Tip size mm	Energy output; mJ/pulse	Time	Conclusions
Schwarz and others ¹⁴	Clinical measurements Microbiological evaluation Follow-up at 6 months	20 patients 660 sites	Yes	Yes	Yes	1.65 × 0.5 1.10 × 0.5	160	Avg. 5 minutes/ single-rooted tooth; 10 minutes/ tooth	Significantly smaller increase in gingival recession and greater reduction in BOP and CAL gain over SRP Comparable reduction in motile rods and spirochetes to SRP
Schwarz and others ⁴⁸	Clinical measurements Microbiological evaluation Follow-up for 12 months	20 patients 600 sites	Yes	Yes	Yes	1.65 × 0.5	160	Avg. 10 minutes/ single-rooted tooth; 10 minutes/ tooth	Comparable improvements in clinical measurements and reduction in motile rods and spirochetes in both groups SRP combined with laser did not seem to improve clinical outcome over laser alone
Schwarz and others ⁴⁹	CAL gain Follow-up for 2 years	20 patients 660 sites	Yes	Yes	Yes	1.65 × 0.5 1.10 × 0.5	160	Avg. 5 minutes/ single-rooted tooth; 16 minutes/ tooth	At 1 and 2 years, laser had a significantly higher BOP reduction and CAL gain At 1 and 2 years, bacterial counts similar to baseline for both groups CAL gain in both groups maintained over 2 years

BOP = bleeding on probing; CAL = clinical attachment level; SRP = scaling and root planing.

the 2 methods; a tendency toward better results with the combined therapy was not statistically significant.

Because clinical results are not improved by adding laser treatment to the gold standard SRP, the use of lasers as an adjunct to debridement should be questioned. Their use potentially adds to treatment time and increases the cost significantly. In a split-mouth study, Sjostrom and Friskopp⁸ investigated several parameters, including patient satisfaction and time added to treatment when an Nd:YAG laser was used as an adjunct to SRP. At 4 months, there tended to be greater improvement after laser-assisted periodontal debridement, although the difference between the groups was not significant. The authors made several important observations. They found that the use of the laser before debridement weakened the attachment of calculus to the root surface, thus facilitating its removal with hand instruments; however, the time needed for debridement increased by 15%. They also noted an analgesic effect of Nd:YAG leading to a significant decrease in requests for local anesthesia by the patients. The hemostasis effect may also prove important in patients who are on anticoagulants or have a bleeding disorder. Patients reported significantly less postoperative pain and swelling when laser treatment was used as an adjunct, although this could be due to the placebo effect that a “new” and “advanced” treatment may have on their perception.

Erbium:Yttrium–Aluminium–Garnet Laser

This is the type of laser most commonly studied for use in periodontal debridement. It has received an enormous

amount of attention in dentistry since its first application in the late 1980s.^{37,38} It has a wavelength of 2,940 nm (2.94 μm), and very high absorption coefficients in water and hydroxyapatite compared with the diode and Nd:YAG lasers. Because of its high rate of absorption in water, the Er:YAG laser ablates hard tissue through “microexplosions” rather than heating the tissue, resulting in minimal thermal side-effects.³² This desirable property of the Er:YAG laser led to its approval in 1997 by the Food and Drug Administration in the United States for use on hard tissues; it was the first dental laser to receive approval for preparation of dental cavities.³⁹ Because calculus is also a hard mineralized substance, various studies have tested the Er:YAG laser for debridement of root surfaces.

Variation in experimental design and laser settings make studies difficult to compare. Most well-designed studies in the peer-reviewed literature are in vitro. Earlier studies⁴⁰ showed detrimental outcomes of Er:YAG laser treatment on cementum surfaces of extracted teeth, including cratering and heat cracking, regardless of the presence of water coolant. Others⁴¹ noted a greater loss of cementum and residual root roughness when root planing with an Er:YAG laser compared with ultrasonics and hand instrumentation; under a scanning electron microscope, complete removal of cementum was apparent in 22.5% of laser-treated teeth compared with 12.5% of teeth treated by scaling alone. These negative outcomes were confirmed in vitro when energy outputs exceeded 50 mJ/pulse,⁴² although undesirable thermal effects were decreased in vitro when water irrigation was used.¹⁸ A water spray may

decrease pulpal wall temperature by 2.2°C.³⁵ It seems that even at a relatively low radiation energy (e.g., 60 mJ), the Er:YAG laser removed considerable calculus, cementum or both, and penetration into the cementum increased significantly at 150 mJ.⁴³ Hand instrumentation may lead to removal of up to 264.4 µm of cementum⁴⁴ or even 343.3 µm.⁴⁵ Ultrasonic instrumentation may penetrate up to 83.3 µm of cementum depending on the roughness of the diamond coating and the application force used by the investigator.⁴⁶ Up to 386.12 µm of cementum was removed from teeth with a laser at 100 mJ.⁴³ However, Aoki and others⁴⁷ disagreed with these findings and reported the maximum removal of cementum by laser of 140 µm (Table 1).

In the few in vivo studies of the Er:YAG laser (Table 2), it was used alone or in conjunction with SRP. In a comparison of laser debridement as monotherapy (160 mJ) with laser debridement as an adjunct to SRP, most clinical parameters improved similarly and remained constant over one year.⁴⁸ However, the recession readings tended to favour the monotherapy laser group, although they were not statistically significant. The authors concluded that there was no clinical benefit derived from adding SRP to laser treatment alone. The same group of investigators¹⁴ compared laser treatment with SRP as monotherapies and again obtained favourable results in the laser-treated teeth. In terms of probing depth and attachment level, both groups showed statistically significant improvement after treatment. For clinical attachment level, more improvement occurred in the laser-treated group than the SRP group, but the difference was not statistically significant. A 2-year prospective study⁴⁹ by the same investigator group confirmed the favourable results with lasers. Sculean and others⁵⁰ compared the use of a laser alone with ultrasonic debridement and found the 2 treatments comparable in effectiveness of calculus removal, although the laser was less efficient than ultrasonic debridement. No differences in clinical improvement were noted.

More prospective studies are necessary to confirm the optimistic results offered by these studies. The Er:YAG laser seems to have a place in periodontal debridement, but it remains to be seen whether predictably positive outcomes can be achieved using it as an adjunct or as a monotherapy.

Conclusions

Bacterial invasion cannot be eradicated by mechanical debridement alone. In some cases, combining mechanical therapy with laser treatment appears beneficial. Some recent controlled studies favour laser-assisted periodontal debridement with a soft-tissue laser or use of a hard-tissue laser as a monotherapy. More in vivo studies are needed to establish the safety and benefit of dental lasers, either as an adjunct or as an alternative to the traditional methods of scaling and root planing. ✦

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Treatment of Self-Inflicted Oral Trauma in a Comatose Patient: A Case Report

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ABSTRACT

Trauma to oral soft tissues in comatose patients may be more widespread than reported, as no extensive study of this problem has been conducted. Various appliances for the prevention of self-inflicted injuries to oral tissues particularly in children and the physically and mentally challenged have been documented, but there is little information on their use in adult comatose patients. Because comatose patients lack cerebral control of the masticatory cycle, they can easily injure themselves. Although it is not uncommon for patients with a decreased level of consciousness and in need of intensive care to be restrained to prevent injury due to involuntary movement of the limbs, head and neck restraint is often difficult and may be dangerous to the patient. This case report presents a simple solution to the problem of self-inflicted trauma to oral tissues.

MeSH Key Words: coma; lip/injuries; mouth protectors; self mutilation/prevention & control

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A team effort is needed in the management of the comatose patient with self-inflicted oral trauma. On occasion, the private dental practitioner may be asked to provide clinical assistance to the team. Prevalence of trauma to oral tissues in the comatose patient is not well documented, but when it occurs it is quite destructive and distressful for both patient and family members. Most reported cases have been in the pediatric or special care journals,¹⁻²² with few reported for the adult decerebrate patient.

The cause of self-injurious behaviour and clinical symptoms varies and the literature is full of examples, especially in children with cerebral palsy,^{1,16,18} severe neuro-disability,²³ Tourette's syndrome,^{3,19} Lesch-Nyhan syndrome,^{4,5,9} Chiari Type II malformations,⁷ congenital insensitivity to pain,^{6,8,12} various psychiatric disorders and encephalitis in infancy.¹¹

Lack of control over the masticatory cycle in the comatose adult patient may sometimes result in neuropathologic chewing,^{21,24} which

in turn may be the result of severe brain damage due to a closed head injury, hypoxia and septic shock.¹³ Management of these cases will vary according to the individual's medical history, frequency and severity of the injury and whether treatment is for the long or short term.

Numerous appliances and techniques have been advocated: occlusal bite planes, ratchet mouth props, padded tongue blades and inter-maxillary fixation, and mandibular-cast silver caps with acrylic bite-blocks.¹³ There are no standards, but it is universally accepted that a removable device is desirable for long-term use in comatose patients. Difficulties that may be encountered with respect to the design of an appliance include lack of cooperation from the patient, inability to gain access to the oral cavity for a proper examination and to take impressions, and the education of caregivers and family members in maintenance of the appliance and proper oral hygiene procedures for the patient.

An appropriate appliance must be simple to make and be well retained and easily serviced. It must also satisfy the following criteria²⁵:

- deflect the tissues most likely to be damaged by involuntary movements of the mandible from the occlusal table
- permit a full range of mandibular movement
- allow for daily oral care
- withstand breakage and displacement forces over an indefinite period
- allow healing of traumatized tissues
- be easily fabricated and placed without risk to the patient.

The following case report describes the use of a simple device in an adult comatose patient. The material used is easily layered or repaired using heat alone without the need for organic solvents.

Case Report

The dental service of the Nihon University School of Dentistry at Matsudo was asked to examine and recommend treatment for a 56-year-old male patient who was intubated in hospital after suffering a subarachnoid hemorrhage caused by the rupture of a cerebral aneurysm. He had sustained self-induced lacerations to his lower lip. The patient underwent a ventriculoperitoneal shunt insertion and nutrition was provided by means of a nasogastric tube following tracheotomy. According to the Japan coma scale, his level of consciousness was III-200 (Box 1). At this level of consciousness, the patient could involuntarily move his arms and legs and frown on painful stimulus, but could not respond to requests, for example, to open his mouth. His medical condition was stable. Hospital staff attempted to control his involuntary masticatory movements by inserting gauze and tongue spatulas between his teeth but this failed (Fig. 1). The patient had been examined previously by another dentist, who had suggested extraction of all lower mandibular incisors to prevent injury. This recommendation is a possible solution, but only as a last resort when all other options have failed.

A thorough examination of the patient was difficult due to the restricted opening of his jaws, but he appeared to have a significant overjet and overbite, suggesting a Class II, Division 1 occlusion. In addition, there was a severe self-inflicted traumatic lesion on his lower lip mainly on the left side (Fig. 2) and a transient ruminatory chewing cycle was observed. This suggested that the lower lip was trapped between the maxillary and mandibular



Figure 1: Patient with gauze wrapped around spatula between teeth.



Figure 2: Laceration on lower lip.

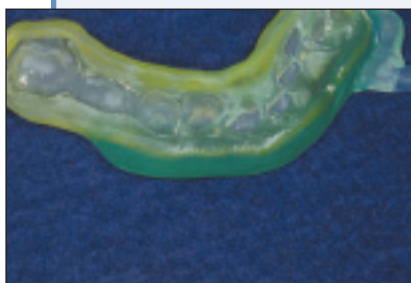


Figure 3: Polyolefin mouthguard.



Figure 4: Mouthguard with handle.

Box 1 Japan coma scale; 3-3-9 system

1. Wakes even without stimulus	
1	Almost lucid, but consciousness is not as clear as it ought to be
2	Disoriented
3	Unable to recall name or birthday
2. Wakes with stimulus, but falls asleep when stimulus ceases	
10	Opens eyes readily when called
20	Opens eyes in response to loud calling or shaking
30	Opens eyes narrowly with repeated calling or painful stimulus
3. Does not wake even with stimulus	
100	Performs motions such as brushing off painful stimulus
200	Moves arms and legs or frowns with painful stimulus
300	No response to painful stimulus

anterior teeth and was acting as a bolus, thus initiating a pathologic chewing cycle. The ulcer created by this action was sizeable; the tissue was edematous and bleeding. All maxillary and mandibular teeth were present except for teeth 36 and 46, which had been replaced with two 3-unit fixed partial dentures. Observed laceration of the lower lip was due to adduction of the lip as a result of sucking and bruxism.



Figure 5: Mouthguard in patient's mouth.



Figure 6: Initial resolution of wound 3 days after placement of mouth-guard.



Figure 7: Two weeks after insertion, fibrotic scar is visible.



Figure 8: Complete resolution of wound.

Because of the difficulty encountered in trying to open the jaw due to trismus, we decided to make a simple, easily serviceable appliance that would satisfy the criteria outlined by Hanson.²⁵ With great difficulty, a gag was used to open the mouth and the opening was secured on the right side with a medium-sized McKesson rubber bite-block (McKesson Mouth Props, Hu-Friedy, Chicago, Ill.).

A unilateral impression was made using a "rim lock" stock tray and irreversible hydrocolloid impression material. A conventional mouthguard was fabricated using a polyolefin sheet (MG21, Molten Medical Inc., Tokyo, Japan) with adequate coverage of teeth 33–47 to ensure good retention (Fig. 3), but not overly extended to avoid impingement on soft tissue and muscle attachment. A long flexible plastic handle made of the same material was attached to the anterior portion of the mouthguard (Fig. 4); this could be secured to the patient's hospital gown with a safety pin to prevent accidental loss or possible inhalation of the appliance should it become dislodged. The labial portion of the appliance was slightly thickened (8 mm) by layering to prevent the lips from becoming trapped between the anterior teeth (Fig. 5). The nursing staff were asked to keep the appliance in the mouth at all times except when it was removed for daily oral hygiene procedures.

Results

Within 3 to 4 days after insertion of the appliance, the nursing staff noted that serious clenching of the jaw had ceased and that it was possible to manipulate the jaw with a tapping motion. Sucking and adduction of the lips had ceased and initial resolution of the wound was observed (Fig. 6). By 14 days after insertion, healing of the wound was noted, with the appearance of a fibrotic scar (Fig. 7). At 4 weeks postinsertion, the lesion had completely resolved.

Although the appliance was removed after healing (Fig. 8), the family asked that it be replaced as a preventive measure in the long term, because they noted that periodically the patient adducted the lips between the anterior teeth. It was decided to comply with the wishes of the family with the proviso that oral hygiene and maintenance would be carried out; a full coverage mandibular mouthguard would be constructed at a later date to avoid any occlusal problems that might arise from wearing a unilateral mouthguard for an extended period; and the patient would be seen by a dentist every 3 months.

Discussion

Trauma to oral soft tissue in adult comatose patients may be more widespread than documented and, although no extensive study has been conducted on the subject, many authors have suggested the fabrication of appliances to prevent self-inflicted trauma, particularly in children.

Mastication and masticatory movements have been described as the result of a complex set of actions that are both voluntary and automatic; these movements involve the coordination of the muscles of mastication operating in a learned pattern to prepare and break down a bolus of food for swallowing. Learning and control of these movements is under the influence of the central cortex, reticular formation and the extra-pyramidal system.²¹ One characteristic of lack of cerebral control is lack of coordination of the masticatory movement, which in turn may lead to self-inflicted trauma to oral tissues. Bruxism seems to appear at different levels of unconsciousness and disappears only after a significant improvement in the level of consciousness.²² Myostatic masticatory reflex may be initiated in a comatose patient if the lips or tongue are trapped between the teeth, mimicking the placement of a bolus of food on the occlusal surfaces of the teeth.²⁶

Management of these patients should be immediate, using an easily fabricated removable appliance in the short term, and a long-term solution should be sought as level of consciousness improves. Ngan and Nelson²¹ state that the design of any appliance depends on the prognosis of the patient, neurologic status and the severity of chewing or bruxing. The practice has been to construct either a full-coverage mouthguard or one covering the anterior sextant using traditional materials; however, these materials lack proper adaptation to the dentition, hence are not adequately retained. Dislodgement of such an appliance may cause even more serious complications if it is inhaled. In this case, a simple cross-arch appliance made of polyolefin was introduced. This mouthguard material is odorless, has good visco-elastic properties and high impact resistance and is easy to laminate and repair by layering using heat rather than adhesives. Because the material is also lightweight and highly resistant to tearing, we were able to fabricate a long handle that could be secured to the patient's garment making it easy for caregivers to remove and replace the device during oral hygiene procedures. The cross-arch design, which covered two-thirds of the mandibular occlusal surface, was successful in resolving the problem in the short term. In the long term, a full arch stent would be more appropriate to prevent an imbalance to the occlusion and inadvertent overeruption of teeth not covered by a partial appliance. ♦

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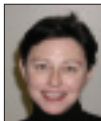
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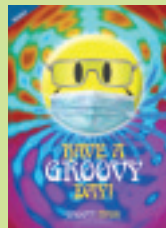
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Pemphigus Vulgaris: A Case-Based Update

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ABSTRACT

Pemphigus vulgaris (PV) is an autoimmune disease accounting for 80% of all cases of pemphigus. Before the advent of corticosteroid therapy, pemphigus was fatal, with a mortality rate of up to 75% in the first year. It is still a serious disorder, but the 5% to 10% mortality rate is now primarily due to the side effects of therapy. In 75% to 80% of cases, PV lesions first appear in the oral cavity. Dentists are therefore in a unique position to recognize the oral manifestations of the disease, allowing early diagnosis and initiation of treatment. The diagnosis is based on pathological examination and immunofluorescence testing. Systemic corticosteroids and steroid-sparing agents are the mainstays of treatment; topical corticosteroids may also be used to accelerate healing of persistent oral lesions. This article describes a 71-year-old woman with multiple chronic ulcers in the oral cavity, in whom PV was diagnosed 4 months after the symptoms first appeared. The article also reviews the current literature on diagnosis and treatment of the condition.

MeSH Key Words: case study; oral ulcer/etiology; pemphigus/drug therapy; pemphigus/immunology

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The autoimmune bullous dermatoses fall into 2 main groups: diseases of the dermo-epidermal junction, which are due to abnormalities at the interface between the dermis and the epidermis (of which pemphigoid is one example) and intraepithelial dermatoses, which include the various forms of pemphigus. Pemphigus results from circulating immunoglobulin G (IgG) antibodies directed against desmosomes; these antibodies interfere with keratinocyte adhesion (Fig. 1). Acantholysis occurs, resulting in the formation of bullae.¹ There are 6 main types of pemphigus and their classification is based on the anatomic features of the lesion and the target antigens recognized by the autoantibodies (Table 1).^{2,3}

Eighty percent of patients with pemphigus have pemphigus vulgaris (PV).¹ The annual incidence is estimated as one case per million population, but the condition is more common among Ashkenazi Jews and people of Mediterranean descent because of an association with certain human leukocyte antigen haplotypes.⁴

Before the advent of corticosteroid therapy, pemphigus was fatal, with a mortality rate of up to 75% in the first year. It is still a serious disorder, but the 5% to 10% mortality rate is now primarily due to the side effects of therapy.⁵ The prognostic factors are age, time between onset of symptoms and initiation of treatment, extent of the lesions and the dose of corticosteroids required to initially control the disease.

This article describes a patient with multiple chronic ulcers in the oral cavity, in whom PV was diagnosed 4 months after the symptoms first appeared. The case study is followed by a review of the literature on the clinical diagnosis and differential diagnosis of PV, as well as the laboratory tests used to confirm the diagnosis and the therapeutic options.

Case Report

A 71-year-old woman presented with debilitating pain in the mouth as well as mouth ulcers that had appeared 4 months previously. She had initially seen her general practitioner for throat irritation, for which bacitracin and

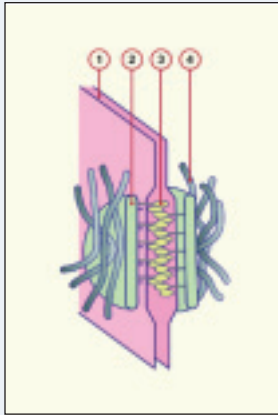


Figure 1: Drawing of a desmosome. Each desmosome attaches to a cell, and its cytoskeleton attaches to the neighbouring cell. 1 = intercellular space, 2 = cytoplasmic plaque made of desmoplakin, 3 = desmoglein (of which there are various kinds, based on cell type), 4 = keratin filaments anchored to the cytoplasmic plaque.

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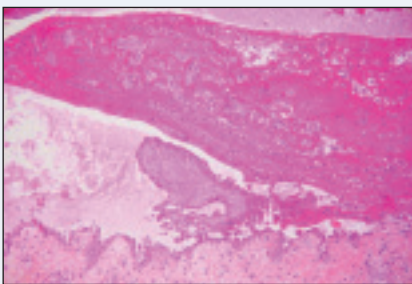


Figure 3: Cutaneous biopsy sample revealed an intraepidermal bulla of pemphigus vulgaris, which has caused cleavage of the suprabasal intraepidermal layer accompanied by acantholysis.



Figure 2: Large aphthoid mucosal lesions (with erosions and abrasion rings in the loosened epithelium) covering the entire oral mucosa. The lesions affected the linea alba of both cheeks and the ventral side of the tongue (2a). The patient also had crusted, erosive lesions on the shoulders and back (2b).



Figure 4: Clinical appearance after 9 months of treatment. All lesions in the oral cavity have resolved.

the loosened epithelium, covering the entire oral mucosa. The lesions affected the linea alba of both cheeks, the gums, the border between the hard and soft palate and the ventral side of the tongue (Fig. 2a). There were 3 crusted erosive lesions on the shoulders and 5 on the lower back (Fig. 2b). Light pressure on the intact skin did not provoke the formation of bullae (negative Nikolsky's sign). A tentative diagnosis of PV was made, and the patient was referred to an internal medicine specialist because of the extent of the lesions and the presence of cutaneous lesions.

The results of blood tests and hepatic and lipid screening tests were normal. Perilesional cutaneous biopsy of the healthy tissue was carried out by the dermatology department. Pathological examination with hematoxylin and eosin dye revealed cleavage of the suprabasal intraepithelial layer, acantholysis and cell infiltration into the underlying connective tissue (Fig. 3). Direct immunofluorescence revealed an IgG deposit and a fraction of C3 complement in the intercellular zones of the epithelium. These elements confirmed the diagnosis of PV.

Initial treatment consisted of a "low Lever scheme" (see explanation below): 0.5 mg/kg prednisone daily (i.e., 40 mg/day for this patient)¹ and 15 mg methotrexate weekly.⁵ After 2 months of treatment, the cutaneous lesions had almost vanished, but the oral lesions had not changed much. The

methotrexate was increased to 20 mg/week and local corticosteroid therapy with beclomethasone was prescribed. After 6 months of treatment, the patient suffered a stress fracture in the neck of her femur probably brought on by the corticosteroid treatment. Prophylactic treatment with bisphosphonate and calcium base had been prescribed at the beginning of the PV therapy, but was stopped after 2 months because the patient could not swallow all of the medications. Once the fracture had healed, treatment of the oral lesions was resumed. By 9 months after the initial diagnosis, the corticosteroid therapy had been reduced to 30 mg/day and the methotrexate to 10 mg/week, and all lesions had disappeared (Fig. 4). Between the ninth and twelfth months of treatment, the corticosteroid therapy was further reduced, first to 20 mg/day and then to 10 mg/day; the dose of methotrexate was maintained at 10 mg/week.

fusafungine (a topical antibacterial anti-inflammatory nasal spray) were prescribed. The symptoms worsened, and she consulted several other practitioners, who prescribed antibiotics, antifungals and topical anti-inflammatory agents. However, she experienced no improvement, and no diagnosis was ever made. The lesions caused odynophagia, which led to a 7% weight loss (6 kg). Her medical history was significant for hypothyroidism, which had been treated for the previous 7 years with levothyroxine sodium, hypertension treated with spironolactone and altizide, glaucoma treated with a collyrium, and recent-onset type 2 diabetes mellitus treated with benfluorex. The patient's outward appearance was normal, but she was depressed because the pain in her mouth had not subsided despite the various treatments. She had no fever, and her blood pressure was normal. An oral examination revealed large aphthoid lesions, with erosions and abrasion rings in

Table 1 Classification of pemphigus³

Type	Anatomic features	Associated antibody	Target antigens
Pemphigus vulgaris (PV) Mucosal PV Cutaneous–mucosal PV Pemphigus vegetans	Persistent, painful oral lesions; skinfolds are affected; vegetans-like; fetid, reddish plaques	IgG IgG IgG	Desmoglein 3 Desmogleins 1 and 3 Desmogleins 1 and 3
Superficial pemphigus Pemphigus foliaceus Pemphigus erythematosus Endemic pemphigus Brazil Tunisia Colombia	Characterized by mainly cutaneous lesions	IgG IgG IgG IgG IgG IgG	Desmoglein 1 Desmoglein 1 Desmoglein 1, desmocollin 1 Desmogleins 1 and 3 Desmoglein 1
Paraneoplastic pemphigus	Characterized by proliferation of various types of tumours, particularly lymphoid hemopathies	IgG	Desmoplakin I/II, desmogleins 1 and 3, envoplakin, periplakin, antigen 170 and 230 kilodalton
IgA pemphigus	Exudative lesions with vesicopustules	IgA	Desmocollin 1 and another unidentified antigen
Herpetiform pemphigus	Rosette-like lesions	IgG	Desmogleins 1 and 3
Drug-induced pemphigus	Mainly cutaneous lesions	IgG	Heterogeneous

Discussion

This case report describes a patient who presented with oral and cutaneous lesions of PV, which was not diagnosed until later in the course of the disease. In 75% to 80% of cases, PV lesions appear first in the oral cavity. Cutaneous lesions are diagnosed within 6 months in 99% of cases, whereas for oral lesions diagnosis within the first 6 months occurs in only 57% of cases. Furthermore, 70% of patients see more than 4 practitioners before the diagnosis is confirmed.^{1,2,6}

Pemphigus is a rare autoimmune disorder with intraepidermal bullous lesions which affect in particular the oral, genital or ocular mucosa and the epidermis. This condition typically affects people between the ages of 50 and 60 and is generally evenly distributed between the sexes. PV, the most common form of pemphigus in Europe, represents 80% of all cases.⁶ The incidence of PV is 0.1–0.5 per 100,000 population in the United States.⁷ The initial lesions are often insidious and localized. The mouth is affected by persistent, painful ulcers and a burning sensation, which affects the appetite. The skin becomes affected several weeks or months after the mucosal lesions appear, with the appearance of flaccid blisters filled with clear fluid. These fragile blisters are eas-

ily broken, which leaves behind erosions surrounded by epidermal rings. Putting pressure on healthy skin causes either a bulla or an erosion; this effect is known as Nikolsky’s sign.^{1,2,8} This sign, although highly suggestive of pemphigus, is not specific and may be absent, as in the patient described here. Histologically, PV is characterized by intraepidermal cleavage, with a basal cellular layer forming the base of the blister. Direct immunofluorescence reveals a homogeneous deposit of IgG and C3 in the intercellular substance.⁴

The differential diagnosis of PV includes certain chronic mucodermatoses, which appear as bullous, ulcerous or erosive lesions (Table 2). In rare cases, pemphigus lesions may be confused with the ulcerative lesions of Crohn’s disease or hemorrhagic rectal colitis or ulcerative lesions due to dietary deficiencies, such as iron (hypochromic iron deficiency), zinc (enteropathic acrodermatitis), folic acid or vitamin B₁₂ (pernicious anemia).^{1,2,8–10}

Pemphigoid can be diagnosed using the “clip sign,”¹ which involves using forceps to detach a flap of epithelium from around a gingival erosion. In erosive lichen planus, the “clip sign” is negative (i.e., it is not possible to detach an epithelial flap), and the associated reticular appearance

Table 2 Differential diagnosis of pemphigus vulgaris^{1,2}

Disease or condition	Signs and symptoms
Mucosa pemphigoid	Positive “clip sign”; linear deposits at the dermo-epidermal junction (demonstrated by direct immunofluorescence)
Erosive lichen planus	Whickham’s striae near erosions
Bullous pemphigoid	Tense bullae or vesicles with clear fluid, which may develop in erythematous or normal skin; intense pruritis; lesions symmetric and tending to appear on the flexion sides and roots of limbs, the anterior-internal side of thighs and the abdomen; rare on mucosa
Linear IgA dermatosis	Symmetric blisters and pruritic lesions; rosettes common
Dermatitis herpetiformis	Starts in adolescence or young adulthood, developing in spurts with spontaneous remissions; symmetric bullae and/or pruriginous vesicles on the elbows, knees and buttocks
Acquired epidermolysis bullosa	Development of bullae at the slightest friction; atrophic scarring on the extension sides of limbs and joints
Behçet’s aphthosis	Ulcers with regular borders, surrounded by a red halo with a flat fibrinous background
Erythema multiforme	Cutaneous rosette-like lesions (3 concentric areas with an inconsistent bullous centre); persistent flaps forming pseudomembranes or crusts on the lips
Disseminated lupus erythematosus	Systemic signs (e.g., fever, asthenia) often accompanied by petechiae, dry mouth and edema
Crohn’s disease and hemorrhagic rectal colitis	Cutaneous–mucosal signs accompanied by abdominal pain, buccal aphthosis, asthenia, weight loss, anorexia
Bullous toxidermia (pigmented, fixed and bullous erythema from Stevens-Johnson’s syndrome and toxic epidermal necrolysis)	Intense onset, rapid development, frequency of mucosal problems and general signs necessitate emergency admission to hospital
Chronic ulcerative stomatitis	Presence of erosive lesions of the oral mucosa
Folic acid or vitamin B ₁₂ deficiency (pernicious anemia)	Oral pain, erythematous tongue, asthenia and anemia; numbness in extremities and psychic troubles
Hypochromic iron deficiency	Paleness; fatigue; headaches; vertigo; buzzing in the ears; irritability; insomnia; problems with concentration; sensitivity to cold; anorexia and nausea
Enteropathic acrodermatitis	Impairment or loss of taste and smell; problems with sight; heavy diarrhea; alopecia; hypertension

facilitates the diagnosis. Herpes in both its acute form and its “crusted” chronic form can be readily diagnosed, especially if the patient is immunodepressed. Herpes lesions usually appear on the lips. Erythema multiforme is diagnosed on the basis of cutaneous lesions, which appear as “rosettes” (round maculopapular lesions made up of several concentric parts). Behçet’s aphthosis is characterized by recurrent aphthoid ulcerations with possible associated genital and/or ocular ulcerations (uveitis, retinal vasculitis).^{1,8,9}

In all cases of suspected pemphigus, a pathological examination must be carried out along with an immunofluorescence test.^{1,9,10}

The treatment depends on the prognostic elements of the condition, such as the extent of the lesions and antibody levels. Treatment is administered in 2 phases: a loading phase, to control the disease, and a maintenance phase, which is further divided into consolidation and treatment tapering. The basic treatment for pemphigus consists of either local or systemic corticosteroid therapy (Table 3).⁷ Local corticosteroid therapy is used in cases

Table 3 Treatments for pemphigus^{7,11,12}

Corticosteroid
<i>Local</i>
Topical
Intralesional
<i>Systemic</i>
By mouth
Parenteral
Adjuvant
<i>Immunosuppressors</i>
Azathioprine
Cyclophosphamide
Methotrexate
Cyclosporine
Chlorambucil
Mycophenolate mofetil
<i>Anti-inflammatory</i>
Dapsone
Sulfamides
Tetracycline
Minocycline
Gold salts (aurothiomalate)
Colchicine
Retinoids
Thalidomide
<i>Antimalarial</i>
Hydroxychloroquine
<i>Immunomodulating therapy</i>
Plasmapheresis
Intravenous γ -globulins

where the PV is not extensive and lesions are limited to the oral cavity. Corticosteroids can be prescribed in the form of a paste, an ointment or a mouthwash administered as monotherapy or as adjunctive therapy with a systemic treatment. Intralesional corticosteroid therapy accelerates the scarring process of a lesion or is used to treat persistent lesions. This treatment, which gives inconsistent results, involves sublesional injections given every 7 to 15 days; treatment is stopped after 3 injections if there is no improvement. Scarring is accompanied by cutaneous or mucosal atrophy,^{7,11} the major drawback of this treatment. Some patients may also see improvement with topical application of tacrolimus.^{6,7} If the patient has extraoral lesions or if the oral damage is extensive, systemic corticosteroid therapy is initiated immediately. The initial dose depends on the chronicity of the lesions and the severity of the disease. A daily application of prednisone 0.5–2 mg/kg is recommended.^{7,13} Depending on the response, the dose is gradually decreased to the minimum therapeutic dose, taken once a day in the morning to minimize side effects.

Corticosteroids taken by mouth have many long-term harmful effects, including adrenal atrophy, abnormal sensitivity to infection, high blood pressure, hypertriglyceridemia, hyperglycemia, cortisone myopathy, erosive duodenitis and stress fracture, as in the case presented here. To minimize iatrogenic effects, Lever and Schaumburg-Lever⁵ recommended a treatment called the “high Lever scheme” with very high loading doses (100–175 mg taken twice daily for 5–10 weeks), followed by the “low Lever scheme,” which includes a rapid reduction in dosage over a few weeks, with a maintenance dose of 40 mg every 2 days accompanied by local adjuvant treatment.⁵ The lack of randomized controlled trials precludes any conclusions as to whether these protocols are superior to those using higher loading doses. An adjuvant drug is prescribed for most patients with severe PV,¹² with the objectives of reducing the cortisone dose and ensuring stable remission. However, the use of adjuvant therapy remains controversial. Therefore, it is only used in cases where corticosteroids are contraindicated, and a lower dosage of the corticosteroids is required. To date, there have been no objective data allowing determination of the best efficacy–tolerance ratio, and no prospective randomized studies have confirmed or invalidated the suitability of using these drugs immediately as an adjunct to corticosteroid therapy. Several adjuvant therapies are used (Table 3). Colchicine, thalidomide and retinoids can be beneficial in mild to moderate cases. Azathioprine and cyclophosphamide are the most commonly used drugs.^{7,12} Azathioprine has a slow onset of action, which is appropriate in mild cases. Cyclophosphamide appears effective in maintaining remission after corticosteroid therapy is discontinued. However, its potential benefits must be weighed against the increased risk of side effects, such as hemorrhagic cystitis or hematological disorders. In a recent study, low-dose methotrexate showed some efficacy with no side effects.¹² Cyclosporine is indicated in cases of hematological abnormalities, which constitute a contraindication to other immunosuppressors. Mycophenolate mofetil is a new drug with few side effects; it has spectacular effects when used in conjunction with corticosteroids. Plasmapheresis is used to eliminate the antibodies responsible for the disease. In addition to its many side effects, the use of plasmapheresis is also limited by its complicated administration and high cost.^{7,11,12} Some traditional methods should be used in association with systemic corticosteroid therapy, such as calcium and vitamin supplements, gastric protecting agents and bisphosphonate treatment (especially if osteopenia has been detected by osteodensitometry).¹³ As a complement to systemic treatment, and if the oral cavity is affected, several steps must be taken to improve the patient’s comfort. Strict local hygiene should be maintained with a diluted antiseptic mouthwash. The adequacy of prosthetic restorations must be checked, and a soft diet may be necessary.

Conclusions

PV is a rare chronic autoimmune cutaneous–mucosal disease that is often diagnosed late, even when oral lesions occur. If not treated promptly, the disease has a high morbidity rate, and it may be fatal in 5% to 10% of cases. The diagnosis is confirmed through pathological examination and direct immunofluorescence testing in the healthy perilesional mucosa. The therapeutic regimen, based on corticosteroid therapy as well as adjuvant treatments, helps to decrease painful symptoms. Current research is directed to finding substitutes for general corticosteroid therapy so as to lower the rates of iatrogenic morbidity. ✎

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How Predictable Are Periodontal Regenerative Procedures?

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ABSTRACT

Periodontal regeneration has become one of the primary objectives of periodontal therapy. The resulting scientific endeavours have elucidated modes of periodontal wound healing, the growth of periodontal cells and their association with the surrounding matrix, and growth-promoting factors. The periodontal regeneration industry is producing better and more expensive devices, but the criteria for evaluating their success have not progressed to the same extent. Although clinical measurements of attachment level and probing depths, along with radiography, are good methods of evaluating tooth survival and prognosis, they do not indicate true biological regeneration. In addition, the regeneration industry may encourage the overuse of allografts and alloplasts which may serve as an impediment to simple wound healing. This review is a critical assessment of the clinical use of various regenerative tools, specifically bone replacements and membranes. The future of the regeneration industry may depend on the merging of various technologies and biological concepts, including the possible use of biological barriers, various bone and periodontal growth inducers, and artificial matrices that will attract or carry the cells necessary for regeneration.

MeSH Key Words: alveolar bone loss/surgery; bone regeneration; guided tissue regeneration, periodontal; membranes, artificial

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Regeneration can be defined as the reproduction or re-formation of organs or tissues that have been lost or injured as a result of a wound or infection. In the periodontium, such regeneration involves the creation of new alveolar bone, cementum and ligament. In this context, regeneration is distinct from tissue repair and is characterized by replacement of the damaged tissues with something that may be inferior to the original tissue both structurally and functionally.¹ Thus, the ideal periodontal treatment should include recruitment of embryonic, pluripotential cells (i.e., periodontal progenitor cells) capable of differentiating into specialized cell types, which will form a functional syncytium connected by highly specialized and appropriately oriented collagen fibres (i.e., Sharpey's fibres). Periodontal regenerative therapy may also be performed in simpler cases in which only bone

is missing (e.g., preprosthetic or preimplant augmentation). In such cases, differentiation of primarily (but not exclusively) bone lineage cells, the osteoblasts, is required to orchestrate new osteogenesis.

The most important question facing practitioners in the field of periodontics is whether predictable regeneration of the periodontium or bone in the oral cavity is even possible (Figs. 1a to 1d). From this question stems an equally important issue, the degree of confidence with which the practitioner can tell the patient that missing bone or attachment apparatus around the teeth can be faithfully regenerated. Indeed, there is little empirical evidence to suggest that current regenerative treatments yield more predictable long-term reductions in tooth loss than conventional debridement therapies (both surgical and nonsurgical).



Figure 1a: A 22-year-old patient referred for implant therapy for missing upper lateral incisor (tooth 22). The ridge had been restored with demineralized, freeze-dried bone allograft (DFDBA) 2 years previously when the tooth was extracted.

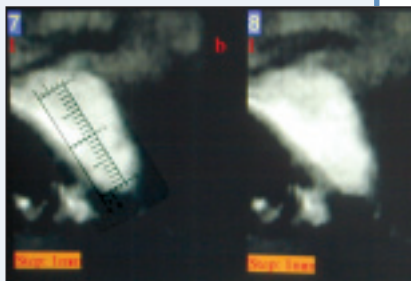


Figure 1b: Esthetic restoration of the missing lateral incisor was the patient's primary concern. Computed tomography imaging of the ridge was performed to ensure adequate buccopalatal bone width and height. The scan showed more than 15 mm of mineralized tissue height and more than 10 mm width at the middle of the ridge.



Figure 1c: Mucoperiosteal flap reflection of the ridge dislodged the mass of mineralized tissue, which left a large defect with no buccal bone. As such, the radiographic evidence of "regeneration" observed in this patient did not accurately portray the degree of treatment success.

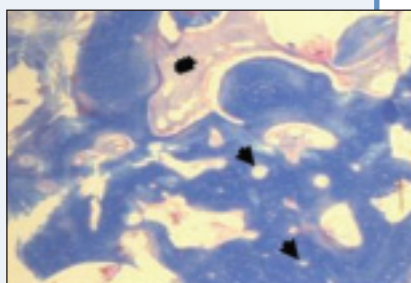


Figure 1d: Photomicrograph of mineralized tissue harvested from the augmented site one year after filling with DFDBA material (stained with Mallory's reagent). The mineralized particles reveal empty, acellular lacunae (black arrows), which are indicative of tissue death. Growth of connective tissue between bone particles (asterisk) was also observed. Original magnification $\times 40$.

have served to explain and predict stable healing of the periodontium in clean, deep osseous defects with optimal osseous architecture, as well as revealing the factors that promote some degree of healing and regeneration.⁹ However, where the loss of periodontal and bone connective tissues is excessive (e.g., cases of severe loss of horizontal alveolar bone), healing after debridement procedures is not followed by significant gains in new attachment. Given these limitations, experimental assessment of various bone grafting methods and other bone replacement materials has been undertaken.

Autogenous Grafts

The need for progenitors, blood supply and morphogens has encouraged the use of autogenous osteogenic tissue for grafting. For example, osseous coagulum bone blend¹⁰ has been and still is used to achieve bone filling in periodontal and osseous defects. The rationale for the use of this mixture as well as blood and osteogenic cells is to supply progenitors and morphogens to the wound site and to promote stable clot formation. Histological analyses of tissues produced following these procedures have confirmed cementogenesis, osteogenesis and re-formation of functionally oriented ligament fibres, even on root surfaces covered with infected accretions.¹¹ Notably, even with autogenous grafts, the formation of functional periodontal fibres and new cementum is limited and generally occurs at the very base of the defect, where the conditions

Periodontal Debridement

The removal of periodontal pathogenic bacteria, mineralized deposits on the root surface and infected cementum containing associated toxins is still one of the most predictable methods leading to stable periodontal healing, if not regeneration. This basic approach, whether achieved by nonsurgical disinfection during closed debridement (e.g., in periodontal pocket depths of up to 5 mm) or by surgical debridement,^{2,3} can lead to the development of a stable attachment apparatus. Surgical debridement of intraosseous defects appears to lead predictably to an increase in periodontal attachment of about 2.5 mm, with variable amounts of bone filling.⁴⁻⁶ The experience and surgical anatomic data reported by Prichard,⁷ Polson and Heijl,⁴ Becker and others,⁶ and Ochsenein,⁸ among others,

are apparently more conducive to regeneration (e.g., in the proximity of a vital periodontal ligament). Moreover, certain types of bone, such as fresh iliac marrow grafts, contain osteoclastic precursors that can promote root resorption and ankylosis.¹²

With the advent of the use of platelet-rich plasma (PRP) to promote regeneration of connective tissue,¹³ the importance of a stable blood clot for successful periodontal regeneration has been recognized. In fact, it has been suggested that PRP, in conjunction with bone and periodontal regenerative therapy, may promote faster healing, which has led to the development of expensive chair-side platelet-purifying centrifuges.¹⁴ It has been claimed that the PRP generated by these units acts as a source of factors that accelerate and improve healing and regeneration

(e.g., transforming growth factor-beta 1 [TGFβ1] and platelet-derived growth factors [PDGF]).¹⁵ However, the notion that PRP increases levels of TGFβ1 and PDGF must be examined carefully. Given that these cytokines modulate and stimulate osteodifferentiation and osteogenesis by serving as chemoattractants and differentiation-stimulating factors for mesenchymal cells,¹⁶ their clinical use should theoretically be beneficial, but this may not be the case in practice. Notably, these cytokines have been shown to have biphasic effects on mesenchymal cells both in vivo and in vitro. In this regard, TGFβ1 and PDGF can also *inhibit* osteogenic cell differentiation,^{17,18} an effect that appears to depend on dose and mode of administration. Indeed, given the vagaries of and variations in the clinical methods for preparing PRP, as well as the limited understanding of the underlying mechanisms of its action, there may be little need for fresh platelet products or the expensive chairside machines used to prepare them.

Non-Autogenous Bone Replacements

The need for sufficient graft material, as well as the complications associated with second-site surgery (used to obtain autogenous bone), led to the development of allograft and alloplastic graft materials (Figs. 2a and 2b). Prior discoveries by Urist¹⁹ showed that demineralized lyophilized bone matrix (DMB) induces *ectopic* osteogenesis, which indicates that DMB should be useful for osteogenic sites requiring augmentation and regeneration. The rationale is that DMB is enriched with morphogens capable of inducing *de novo* formation of mineralized connective tissues.^{9,19} Implantation of DMB into periodontal or bone defects can lead to increases in clinical attachment levels and increased bone filling.^{20,21} In this regard, the use of freeze-dried bone allografts (FDBA) or demineralized FDBA has led to the filling of periodontal defects



Figure 2a: Alloplastic grafting. Post-debridement image of the posterior lower sextant shows extensive bone resorption with reverse architecture and deep intrabony defects. Conservative resective surgery would have resulted in exposure of the furcation of the first and second molars and would have worsened the prognosis.



Figure 2b: The defects were filled with hydroxyapatite filler (an alloplast) to replace the missing bone and perhaps the periodontal ligament as well. It was anticipated that the alloplast would also provide support for the gingival tissues.



Figure 3a: Mandibular second molar with deep lingual probing depth and normal vitality.

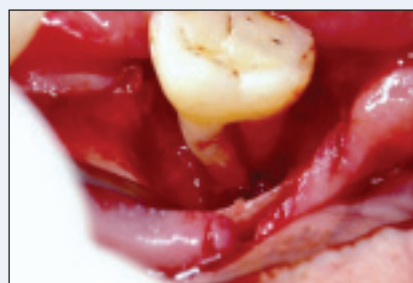


Figure 3b: Surgical exposure revealed a wide, deep circumferential defect surrounded by sound osseous walls. A resorbable membrane was adapted and secured without bone replacement or filler.

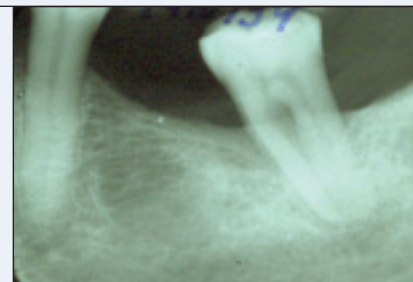
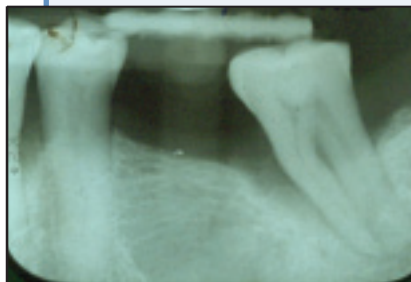


Figure 3c: Radiographs of the mandibular second molar during surgery (left panel) and one year later, during re-entry (right panel). The defect appeared quite wide and extended to the apex. It was filled with radiopaque material with a density similar to that of the surrounding tissue, which was suggestive of new bone.



Figure 3d: Re-entry procedure showed that the defect was filled with mineralized connective tissue consistent with bone regeneration.

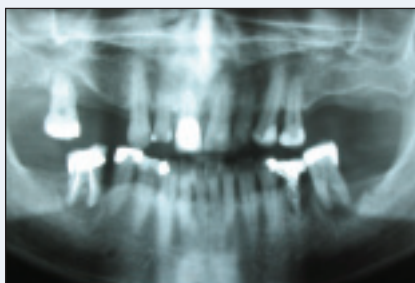


Figure 4a: Implant candidate. The panoramic radiograph shows 3 foci of extensive bone destruction and combined periodontal–endodontic lesions (teeth 17, 36, 35 and 46). The teeth were extracted and the defects debrided to remove residual inflammatory and granulation tissue. Surgical manipulation was performed to protect the healing sockets.

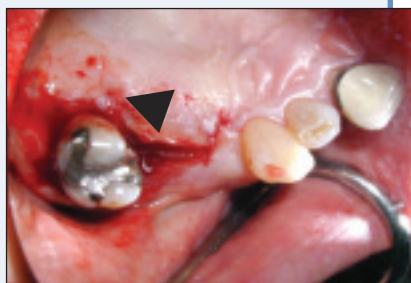


Figure 4b: Tooth 17 exhibited loss of bone approximating the sinus floor. A split-thickness flap of the palatal tissue is visible (arrow).



Figure 4c: The underlying connective tissue, still connected to its blood supply, was rotated and sutured to cover the socket and protect the sinus and the extraction socket.

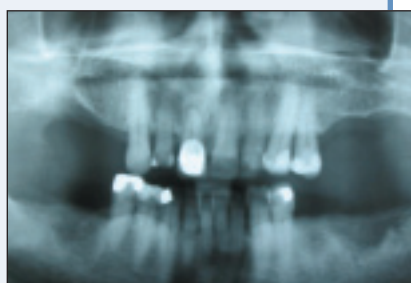


Figure 4d: Panoramic radiograph taken at the time of implant placement, 6 months later, shows normal healing, which allowed placement of endosseous implants at least 4 mm in diameter and 12 mm in length.

with the other caveats mentioned above, the value of these materials for periodontal or bone regeneration remains questionable. This variability in actual bone formation might be explained by the small quantity of bone morphogenetic proteins (BMPs) that are present in bone, especially the adult cortical bone used by bone banks, given that, in previous studies, embryonic bone has been more osteoinductive than bone derived from adult donors.²⁷ In view of the very low and unpredictable quantities of BMPs in adult human bone graft preparations, successful clinical results have been attributed to other noncollagenous proteins in allograft preparations that might be osteostimulative. Therefore, although bone allografting can be considered safe and may improve probing depth and radiopacity, its biological effectiveness is still in question.

Guided Tissue Regeneration and Cell Exclusion Techniques

The rationale for the use of guided tissue regeneration (GTR) was first described in 1976 by Melcher, who suggested that differences in the behaviour and characteristics of attachment cells lead to *repair* of the periodontium by epithelium instead of *regeneration* with periodontal progenitor cells.²⁸ Interestingly, earlier studies had suggested that exclusion of the oral epithelium could lead to improvements in periodontal

healing after surgery.^{29,30} This concept led to the development of epithelial exclusion methods, which apparently led in turn to more predictable filling of intraosseous defects around periodontally diseased teeth.^{7,26} To further refine this approach, surgical sites were sometimes covered with autogenous barriers such as free gingival grafts, which would provide more primary closure and may also assist in cell exclusion. The principles of selective cell repopulation, ultimately termed GTR, were developed further by Nyman and his colleagues.³¹ By using selective approximation of periodontal instead of gingival tissue, new connective tissue attachment can form on previously diseased roots. The use of membrane filters also fulfilled the principles of tissue exclusion; when placed properly within a surgical wound, these membranes induced new cementum formation with oriented periodontal fibres.³²

The development of various barrier-based treatment modalities and techniques and a wide range of nonresorbable

with mineralized bone-like material.²² Although regeneration may or may not take place with this type of grafting, some reports have described the development of new cementum, oriented periodontal fibres and 1.2 mm of new periodontal attachment.^{20,22–24} This gain in attachment may be independent of the grafted material and may be more the result of removal of etiological factors. Notably, FDDBA and demineralized FDDBA produce variable healing results over time, which may be related to tissue bank processing, possible antigenicity or even the source of the bone.²³ In some cases defect filling induced by FDDBA or demineralized FDDBA was no better than that induced by other agents thought to be inferior, such as alloplastic materials.²⁵ Moreover, bone allografts have been shown to persist as foreign and dead mineralized particles at the grafted site (Figs. 1c and 1d),²⁶ which might interfere with normal healing of bone. Other case reports have documented lack of resorption of such allograft materials; hence, along

and resorbable membranes gave rise to the acceptance of another tissue regenerative approach focused solely on bone regeneration: guided bone regeneration. This method allows for migration of osteoprogenitor cells within the area protected by the barrier, in the absence of infection. As noted above, however, newly regenerated tissues created by GTR methods often occur at the base of the periodontal defect, an area that may be more prone to true regeneration than the more coronal aspects of the defect. Regenerative procedures can be complemented by the addition of osteogenic inducers^{9,16,33} (e.g. BMP or enamel matrix proteins), which are not discussed here. Notably, even in the absence of such osteogenic inducers, cell exclusion and space-making approaches to the treatment of periodontal defects seem to lead to more favourable healing (Figs. 3a to 3d).

Conclusions

Given the many unknowns outlined here, it is important to understand the various limitations in the assessment of periodontal regeneration, such as confirming the formation of bone rather than ectopically mineralized fibrous tissues, as well as the re-formation of the attachment apparatus after therapy. The predictability of regeneration is affected by anatomic factors, as outlined at the outset of this article, and by host systemic factors (e.g., smoking, chronic diseases). These issues, although important, are beyond the scope of this paper. Moreover, as stated above, even with the “best” regenerative treatments available, it is probably appropriate to overcome the clinical impulse to fill or regenerate every defect, so that simpler approaches to controlling disease, which have greater evidence for long-term success can be used (Figs. 4a to 4d).

As our understanding of stem cells, matrix and morphogens increases, there is hope that their contribution to regeneration will eventually lead to combined therapy based on sound scientific principles. ♦

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Susan Roberts, FLMI, ACS

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ity of life are its appeal. One of Lethbridge's premier dental offices is now for sale in the second busiest mall in the city. This vibrant office offers both exclusivity and exposure. Go to www.drchuck.ca and www.lethbridgepages.com. D1683

BRITISH COLUMBIA - Coquitlam: Suburban Vancouver. Solid family practice in small clinic shared with 2 other dentists. Three operatories, gross over \$500,000 working 4 short days/week. Great potential to work longer or bring in associate. Take over current 5-year lease with 5-year options. Possible future purchase of one third share of building. Contact: tel./fax (604) 461-1381. D1757

BRITISH COLUMBIA - Whistler: An "Outdoors Sophisticate" is required for a 3-chair, state-of-the-art practice in the heart of Whistler Village. Practice is fully equipped (e.g. digital x-ray and intraoral cameras). Low overhead (30-year lease); Monday - Thursday (other partner does Thursday to Sunday). We are the only retail dental office in Whistler - ideal for experienced dentist who wants a high-grossing, high-net office with lots of cosmetic dentistry and routine endo and surgery. Please fax Kim, (604) 629-0759 or check out our Web site www.aarm-dental.com. E-mail aarm@axion.net. D1771

BRITISH COLUMBIA - Vancouver Island: Incredible opportunity, incredible low price. Go to www.buymydentalpractice.com. D1769

BRITISH COLUMBIA - Grand Forks: Enjoy our low cost of living and relaxed lifestyle in a smaller community with vast recreational opportunities. Selling below appraisal due to health. Low overhead, little competition, full-time hygienist, newer building with 3 operatories plumbed for 4. Contact: Kim, tel. (250) 442-0075, e-mail kleroy@telus.net. D1775

BRITISH COLUMBIA - Nelson: Beautifully located, well-appointed family practice; 4 operatories (2 left hand, 2 right hand). Excellent dentistry, management and facility. Owner will associate back for smooth transition. For more details e-mail dentprac4sale@yahoo.ca.

D1776

BRITISH COLUMBIA - Vancouver Area: Established oral surgery practice for sale with good referral base. Located in large, growing suburban area. Hospital privileges. For more information, please reply to: CDA Classified Box # 2849.

D1789

BRITISH COLUMBIA - Central Interior: Well-established general practice for sale. Gross \$360,000+ working 3-4 days per week or work more with low stress and overhead. Very efficiently run and excellent cash flow. This is a good opportunity to earn instant income for a new graduate or a dentist new to Canada if one desires a laid-back lifestyle and small-town living. Will sell assets and price negotiable. E-mail for details disala@hotmail.com.

D1745

BRITISH COLUMBIA - South Vancouver Island: Mature, active periodontal practice. Large referral base of very high-quality general dentists and specialists. Vendor willing to stay on as a limited part-time associate. Contact: Ron MacKenzie, tel. (604) 685-9227, e-mail mackenz@telus.net.

D1718

MANITOBA - Winnipeg: Established general practice for sale. Professionally appraised. Cost-sharing set-up in mall location with great exposure, parking and new patient flow; 4-day work week with annual gross exceeding \$800,000. This turnkey clinic has 9 operatories with 2 associates and orthodontist on site. Owner returning to academics/graduate studies. Interested parties e-mail drewbrueckner@shaw.ca or leave message at tel. (204) 477-8753.

D1709

MANITOBA - South: Long-established rural practice, same location 30 years. Attractive, modern, 6 operatories, computerized, digital radiography, excellent hygiene program. High personal income for owner, gross well over \$750,000 per year. Current owner relocating out of

province. Reply to: "Dental Practice", c/o 15 Kingsborough Dr., Winnipeg, MB R3P 1H9 or fax (204) 987-8493.

D1710

ONTARIO - Woodbridge: Opportunity to purchase an established general practice. Vendor willing to stay on as a limited part-time associate. Call (416) 821-7732 for more information. Private sale.

D1787

ONTARIO - Ottawa (central): Three operatories, 1,200 sq. ft., good patient base, good income, room for expansion, 4-day practice. Owner leaving but will assist for smooth transition. E-mail P_T_Y_B@hotmail.com; PO Box 4959, Stn. E, Ottawa, ON K1S 5J1.

D1708

SASKATCHEWAN - Lloydminster: Location well suited for GP's or any dental specialists. Exceptionally located in the downtown area. Owner retiring. Annual gross: \$870,000. Six chairs. Great equipment, including: intraoral camera, fiberoptic, Pan., NO3 in each operatory, surgical operatory with the full CPR and anaesthetic equipment; 1700 active charts. For more information call Dr. J. Chai, (780) 432-1486 or reply to: CDA Classified Box # 2850.

D1803

NEW ENGLAND AND NEW YORK, US: Since 1981 Jim Kasper Associates, LLC has the largest selection of quality practices available. General, OMS and Endo. Maine, New Hampshire, Vermont, Connecticut and Massachusetts. Appraisals and associateships too. Visit Web site www.JimKasper.com, tel. (603) 355-2260 or e-mail info@JimKasper.com.

D1741

VERMONT, US: We have a number of practices available for sale in Vermont and financing is also available for qualified candidates. (#721) Woodstock area, gross \$1,000,000, 7 operatories; (#725) St. Johnsbury, gross \$752,000; (#727) Woodstock area, gross \$212,000, net 57%; (#728) Vergennes, gross \$700,000, net \$303,000; (#729) Newport, gross \$855,000, net \$478,000. Associate positions also available. Tel. (401) 270-4747, or www.almontgroup.com.

D1765

Positions Available

ALBERTA - Edmonton: Full-time associate required for growing office on the

south side. Fax resume to (780) 444-1471. Confidentiality guaranteed.

D1806

ALBERTA - Southern: Associate required immediately. Well-established family practice in sunny southern Alberta requires skilled candidate to do all molar endodontics, extractions, and minor orthodontics, in addition to restorative dentistry. Position can evolve to cost-sharing opportunity for the right candidate. Please send all enquiries to e-mail sipeacock@shaw.ca, or fax to (403) 320-7741, or call Ellen at (403) 320-6644 for more information.

D1807

ALBERTA - West Edmonton: Associate dentist required immediately for busy, progressive, well-established group office. All aspects of general dentistry, excellent recare and hygiene program, high new patient flow, as well as acute emergency treatment. Outstanding income potential for the motivated practitioner. Four- to 5-day full-time schedule with some rotating extended hours. Present associate leaving. Please fax resume/letter of interest to (780) 438-5070.

D1808

ALBERTA - Jasper: Full-time associate required for beautiful Rocky Mountain town. Will take over existing patient load of present associate who is leaving. New associate will join two other dentists and cover Jasper clinic and satellite clinic in Valemount, British Columbia. Excellent hygiene program. An outstanding opportunity for the right candidate to become a future partner. If you are looking to be part of a fun and caring team, have a full and productive schedule and enjoy the lifestyle that Jasper offers, please fax resume to (780) 852-4048.

D1809

ALBERTA - Red Deer: Associate for busy family practice. Located 10 minutes outside of Red Deer in Blackfalds. Work week includes two evenings and every second Saturday. Start position flexible. Fax resume to (403) 885-5764 or (403) 340-5642.

D1810

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

D1817



Health Canada Santé Canada

PRACTISE DENTISTRY IN FIRST NATIONS COMMUNITIES

FLY-IN LOCATIONS FLEXIBLE SCHEDULING: FULL- OR PART-TIME

Practise dentistry while experiencing the culture of First Nations in their own communities.

The Government of Canada contracts with licensed Manitoba dentists to travel to First Nations communities in Manitoba to provide dental services. We currently have a requirement for dental services in fly-in communities. Services are required for week-long periods.

For more information, contact:

Jim McLeod, Dental Program Manager 204-983-2871

or

Janice Dyck, Dental Office Manager 204-983-2907

**Dental Unit
First Nations and Inuit Health Branch
Health Canada
300 - 391 York Avenue
Winnipeg, MB R3C 4W1**

Canada

D1801



SOLICITOR GENERAL
AND PUBLIC SECURITY

DENTIST

The Alberta Solicitor General and Public Security is seeking a qualified dentist to provide dental services at the Calgary Remand Centre, Calgary Correctional Centre and the Calgary Young Offender Centre for one, 7-hour session, weekly.

The medical units at the three facilities include an infirmary, medical and dental offices, patient examination rooms and nursing and administrative support staff.

For a complete description of this opportunity and the requirements please contact:

**Ion Grigoriu
Health Care Manager/Director of
Assessment and Treatment Unit
E-mail ion.grigoriu@gov.ab.ca
Fax (403) 241-4320**

All submissions must be received in writing prior to November 21, 2005.

D1802



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

The College of Dentistry invites applications from qualified individuals for a faculty position in oral/maxillofacial surgery. The college is implementing an active program of curriculum renewal, faculty renewal, and research intensification. This position is a key part of that process. Start date is July 1, 2006 or when a suitable candidate is found. Responsibilities and duties include didactic and clinical instruction of undergraduate students in oral/maxillofacial surgery, an ongoing research commitment, and college administration. The applicant must have relevant postgraduate and clinical qualifications at the FRCD(C) or equivalent level and research experience. Possession of an advanced degree is desirable. The MD degree would be an asset. The ideal candidate will be from a CDA/ADA-approved oral/maxillofacial surgery residency program with significant experience in dentoalveolar and orthognathic surgery, TMD, anaesthesia, implantology, pathology and trauma management. On-site private practice privileges are available. The Royal University Hospital and College of Medicine are adjacent to the College of Dentistry and the successful candidate is expected to become involved with programs and initiatives in these institutions. Rank and salary will be commensurate with experience and qualifications. The university is committed to employment equity. Members of designated groups (women, Aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their applications. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Further information about our college and its programs are available at www.usask.ca/dentistry.

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

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

Applications with complete documentation will be accepted until January 31, 2006 or until a suitable candidate is found.

D1800



GENERAL DENTIST

Grenfell Regional Health Services invites applications for the position of permanent general dentist on a full-time basis for northern Newfoundland and southern Labrador, effective April 1, 2005. This is a challenging and interesting area where dental services are provided from regional bases in Newfoundland and travelling clinics on the south Labrador coast. The travelling requirement is approximately 1/3 of the total working time.

Salary for this position is on an 11 point government scale of \$75,433-\$94,916. Initial placement on this scale will be dependent on years of experience. An isolation bonus payment ranging from \$5,000-\$10,000 will be payable upon the completion of 1 full year of service. Currently, a retention incentive of \$10,000 annually, payable bi-weekly, is also in effect.

Fringe benefits include 6 weeks paid leave in a 12 month term. Assistance with relocation and continuing education costs are available. Accommodations are available at a reasonable rate.

Applicants must be eligible for registration with the Newfoundland and Labrador Dental Board. Preference will be given to applicants who are agreeable to working for a minimum 24 month term. Experience in oral surgery is desirable. Experience in general dentistry is essential.

Successful applicant will be required to submit a Certificate of Conduct.

Interested individuals are requested to submit resumes, along with names and addresses of referees, stating competition number, 05.03, to:

**Scott Smith
Manager, Human Resources
Grenfell Regional Health Services
St. Anthony, NL A0K 4S0
Canada
Tel. (709) 454-0347
Fax (709) 454-3301
E-mail humanresources@grhs.nf.ca**

D1664

ALBERTA - Lloydminster: Full-time general practice associate position in a very busy office; 80 - 100 new patients a month, no evenings or weekends, great patients and an awesome team! Please e-mail kavasha@telusplanet.net or telephone Craig at (780) 875-4222. D1818

ALBERTA - Edmonton: Practice opportunity. 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. Enquiries from recent graduates welcome. Please fax CV in confidence to (780) 472-9835 or e-mail drdch@compuserve.com. D1767

ALBERTA - Lloydminster: Looking for a full-time associate to begin work when office renovations have been completed. This clinic is less than 2 years old, but we must grow to meet demand. We are fully computerized, including charts and radiographs. Office hours are weekdays only - no nights or weekends. This non-assignment practice will pay the associate 40% of collections, which means you don't have to work the first month for next to nothing. The associate will have sole use of 2 brand new operatories and a large office. November 1 start. Please fax resume to: Dr. Dean Sexsmith, (780) 875-2097 or e-mail to westlakedental@shaw.ca. D1784

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

ALBERTA - Slave Lake: Full-time associate required for a busy practice. Well-established office with six operatories. Excellent opportunity for new graduates or experienced dentist. Please contact: Jose Antony, Office Manager, tel. (780) 849-4477 or fax resume to (780) 849-6332. D1621

BRITISH COLUMBIA - Terrace: Third dentist needed. Come join an experienced team performing in the top 10 percent of their field! We offer: a modern facility in an area of outstanding beauty, a flexible environment which allows you to work at your own pace, generous compensation which increases with productivity. Consideration will be given to full-time, part-time or locum arrangements. Call Bonnie Olson, (250) 638-0841. D1819

BRITISH COLUMBIA - Whistler: An "Outdoors Sophisticate" is required for associate (purchase an option) in a busy 3-chair, state-of-the-art practice. We are the only retail dental office in Whistler. Minimum 1 year experience, with sup-urb cosmetic, endo and surgery skills, ability to work independently. Initial accommodation provided. Remuneration from 35% to 50%. Please fax Kim, (604) 629-0759 or check out Web site www.aarm-dental.com. E-mail aarm@axion.net. D1770

BRITISH COLUMBIA - Vancouver: Prosthodontist or endodontist needed to associate, partner, or share office in an established periodontal practice in a growing area of Vancouver. Part/full time. Proven record of previous endodontics services. 3,333 sq. ft. of space with 6 operatories and available space for

expansion. Call (604) 939-8467 or e-mail info@perio-dentalimplants.com. D1735

BRITISH COLUMBIA - Kamloops: Associate required for a busy general practice. Wide range of dentistry and a wonderful staff. Buy-in an option for the right candidate. Interested applicants please call (250) 374-4544 or e-mail abtucker@telus.net. D1596

MANITOBA - Winnipeg: Redwood Dental Centre is seeking full-time or part-time associate positions for well-established, large dental practice. We have an excellent reputation over the past 40 years. Please contact: Dr. Darryl Burke, tel. (204) 586-8331, fax (204) 586-3372. D1780

MANITOBA - Winnipeg: Associate required for a well-established family practice. Excellent opportunity for a motivated individual. Please forward your resume to: e-mail dentists@mts.net or fax (204) 774-0465. D1799

NEW BRUNSWICK - Fredericton: Associate required for well-established dental clinic with option to purchase. Excellent opportunity for caring, committed individual to work with great staff and patients in busy, modern family-oriented practice. No evenings/weekends, new graduates welcome. Please submit resume to: CDA Classified Box # 2848. D1786

NEWFOUNDLAND AND LABRADOR - Bay Roberts: Full-time associate dentist required. Very busy general dentistry practice in Bay Roberts, Newfoundland requires the services of a motivated, hard-working, associate dentist. Our practice is located 45 minutes west of St. John's in one of



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Course registration and travel done exclusively through Sandy Cooke at Navigant Performance Group; tel. (800) 324-5185 or (204) 885-8401. Resort and course information can be viewed at: www.navigantperformancegroup.com/group.

Space is limited and our seating was sold out before Christmas last year so don't be disappointed, **register early!!**

D1779

FULL-TIME ASSOCIATE

Moose Jaw, Saskatchewan

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

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

D1696

the fastest growing communities in Newfoundland. We provide a full range of dental care to our patients. The practice has seen tremendous growth over the past 3 years. We currently have 3 full-time dentists in our office and 2 full-time dental hygienists. This is an excellent income opportunity for any dentist, especially recent graduates. A buy-in option, after 1 year's service, is available for the right candidate. All interested individuals can fax or mail their letters of interest and resumes to: Dr. Michelle Zwicker, PO Box 1560, Bay Roberts, NL A0A 1G0, tel. (709) 786-0895 or e-mail mdzwicker@nf.sympatico.ca. D1768

NORTHWEST TERRITORIES - Inuvik and neighbouring communities: Full-time associate needed from January to June 2006. Full appointment book. For a dentist who wants to work hard while discovering the beauties of the Great North. Fax resume to (867) 777-2774 or call (867) 678-2450. D1790

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

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. D1497

ONTARIO - Windsor: Oral and 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 e-mail multari@mnsi.net. D1812



FACULTY POSITION AVAILABLE IN:

The Division of Patient Care and the Office of Clinical Affairs Director of Emergency/Recall Clinic

The Faculty of Dentistry, Dalhousie University, Halifax, Nova Scotia, is seeking applications for a full-time, 2-year term position in the Division of Patient Care in the Department of Dental Clinical Sciences, and in the Office of Clinical Affairs.

In addition to coordinating the operations of the new Emergency/Recall Clinic (including providing patient care), responsibilities will include undergraduate teaching, both didactic and clinical, associated administrative duties, and continuing education presentations. This will be a 4-day a week appointment with the option of a fifth day to provide patient care as an associate dentist in the clinics.

It is expected that the successful applicant will be an experienced general practitioner with a minimum of 5 years (preferably 10) of private practice experience and efficient in all phases of general dentistry with particular expertise in the diagnosis of oral and maxillo-facial pain and the management of dental emergencies (particularly in endodontics and restorative dentistry). The successful candidate will be experienced in managing a busy emergency-based practice as well as organizing and managing a preventive team. He/she should have experience and an interest in teaching dental and dental hygiene students in a general practice setting.

Salary and academic rank will be commensurate with qualifications, experience and achievements. Part of the salary will be based on an associate contract with bonus provisions for productivity.

The successful applicant must be eligible for licensure in Nova Scotia. Private practice privilege is integrated with the appointment.

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Dalhousie University is an Employment Equity/Affirmative Action employer. The university encourages applications from qualified Aboriginal people, persons with a disability, racially visible persons, and women.

Dalhousie University is one of Canada's leading teaching and research universities, with four professional Faculties, a Faculty of Graduate Studies and a diverse complement of graduate programs. Collaborative and interactive research is encouraged, as is cooperation in teaching among the faculties. We inspire students, faculty, staff, and graduates to make significant contributions to our region, Canada, and the world. Dalhousie is located in Halifax, Nova Scotia, which is a vibrant capital city, and the business, academic, and medical centre for Canada's east coast.

Review of applications will begin in October 2005. Applicants should submit a letter of application with Curriculum Vitae, and the names, addresses, and e-mail addresses of three referees to:

Dr. H. A. Ryding, Chair Search Committee
Faculty of Dentistry, Dalhousie University
Halifax, Nova Scotia B3H 3J5

ONTARIO - West of Toronto: Full-time associate position in a well-established practice, replacing associate who has returned to school for graduate studies. Your schedule will be fully booked from day 1. You will have the opportunity to be exposed to all aspects of dentistry such as cosmetics, implants and much more, as we have a team of specialists working alongside of us! If you are a team player and are looking for a positive working environment, fax (905) 846-5593. D1815

ONTARIO - West of Toronto: Busy general practice requires periodontist 1 day per week. Please call (416) 930-1673. D1816

ONTARIO - Stouffville: (Thirty minutes north of Toronto). Part-time locum needed in friendly, progressive family practice to cover maternity leave. Position to start December 2005 for 5-6 months (negotiable). Please call (416) 429-7625 or fax (905) 640-8950. D1764

ONTARIO - Woodbridge: A dedicated, people-oriented associate required for a growing dental practice in a high-traffic area. Three years experience preferred. Please fax resume, (905) 851-8916. D1785

ONTARIO - Eastern: Full-time bilingual dentist wanted to associate in our busy and modern dental practice with a friendly and professional staff. Opportunity for partnership/buy-in and eventually full ownership. Please send CV or reply by e-mail to: drfb2709@bellnet.ca. D1781

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 Web site at www.altima.ca or contact: Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828 ext. 201, or via e-mail drgeorge@altima.ca. D1783

ONTARIO - Innisfil: A dedicated, people-oriented associate required for a new practice. Part time leading to full time. Three years experience preferred. Please fax resume, (905) 851-8916. D1786

ONTARIO - Stouffville: Part-time dental associate position available for a

family-oriented, well-established soft tissue management practice. Please fax your resume to (905) 640-8786 or call Julie, (905) 640-8938. D1756

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

PRINCE EDWARD ISLAND: Oral maxillofacial surgeon. Opportunities available for associateship leading to partnership in all aspects of busy oral surgery practice in Atlantic Canada. Hospital privileges available. If interested please reply to: CDA Classified Box # 2843. Tel (902) 892-2970 (bus.), (902) 892-8337 (res.). D1548

QUEBEC - Outaouais-Gatineau: Associate wanted. Excellence-oriented dentist needed in busy, multidisciplinary group practice. Ideal location, 125 new patients per month, very low RAMQ percentage. Looking for a bilingual dentist with great interpersonal skills, friendly and team-oriented. A hygienist will be available. Please send contact information by fax at (819) 246-2662 or by e-mail at centredentairelimbour@videotron.ca. D1712

SASKATCHEWAN - Meadow Lake: If you are searching for a position that offers a fully booked schedule, great income potential and the opportunity to do all aspects of dentistry, consider this practice. Candidate must be a good communicator and have a commitment to providing quality dentistry in a caring manner to all age groups. Modern office fully computerized with digital x-rays. The town of Meadow Lake borders on one of the largest and most beautiful parks in the province and boasts ample opportunities for the outdoor enthusiast as well as being a great place to raise a family with activities for all ages and interests. Tel. (306) 236-3707 or fax (306) 236-5370. E-mail sbudd@sasktel.net. D1782

SASKATCHEWAN - Regina: Full-time associate required to join our well-established, thriving dental clinic. Our state-of-the-art facility was built in

April 2004. The clinic offers all aspects of dentistry, including cosmetics, implants (both surgical and restorative) and orthodontics, with an excellent support staff. Opportunity for future buy-in available to the right candidate. E-mail info@signaturesmiles.ca, fax (306) 584-8422, tel. (306) 584-2833 during the day or (306) 781-3059 in the evening. D1711

TEXAS - Dallas: Growing dental company in and around Dallas is seeking full-time associates. Must be licensed or qualified to be licensed in Texas. Highest compensation package in the state; earn \$200,000 - \$400,000. Company to handle all immigration matters. Please call (630) 788-7167. D1533

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

Positions Sought

ONTARIO: Experienced periodontist available to perform surgical procedures in your busy general dental practice. Available to offices from Mississauga to Grimsby. Please reply to: CDA Classified Box # 2851. D1805

Equipment Sales & Service

DENTAL EQUIPMENT FOR SALE: 1999 Pro II dental chair, unit, etc.; Adec unit, Cavo equipment, articulators, etc. Everything to set up one complete room and lab. Looks new. Very lightly used. Tel. (705) 497-9577. North Bay. D1804

PAN-CEPH MACHINE: Calgary orthodontic clinic looking for dentist/orthodontist to assume existing lease for newly purchased Pan-Ceph machine. Initial 16 monthly payments have already been made. For further information please call Arv Dhol, (403) 512-8697 or Dr. Wally Dhol, (403) 614-9206. D1813

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John Webster, CFP

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* Restrictions may apply to advisory services in certain jurisdictions.

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CDA Fund Performance (for period ending August 31, 2005)

	MER	1 year	3 years	5 years	10 years
CDA Canadian Growth Funds					
Aggressive Equity fund (Altamira)	up to 1.00%	15.0%	16.6%	6.5%	9.5%
Common Stock fund (Altamira)	up to 0.99%	22.1%	14.8%	-0.3%	7.7%
Canadian Equity fund (Trimark) ^{†1}	up to 1.65%	13.6%	12.4%	7.0%	8.9%
Dividend fund (PH&N) ^{†2}	up to 1.20%	18.2%	16.6%	11.8%	17.7%
Special Equity fund (KBSH) ^{†3}	up to 1.45%	24.3%	15.6%	-7.5%	15.0%
TSX Composite Index fund (BGI) ^{††}	up to 0.67%	28.7%	18.8%	0.0%	10.2%
CDA International Growth Funds					
Emerging Markets fund (KBSH)	up to 1.45%	15.1%	18.2%	2.8%	1.7%
European fund (KBSH)	up to 1.45%	10.1%	-0.9%	-13.7%	3.2%
International Equity fund (CC&L)	up to 1.30%	2.6%	0.6%	-13.1%	2.0%
Pacific Basin fund (KBSH)	up to 1.45%	3.4%	1.4%	-18.9%	-1.0%
US Equity fund (KBSH) ^{†4}	up to 1.20%	-1.2%	-2.9%	-12.1%	7.5%
Global fund (Trimark) ^{†5}	up to 1.65%	5.7%	3.8%	4.6%	8.4%
Global Stock fund (Templeton) ^{†6}	up to 1.77%	9.5%	5.6%	-0.9%	n/a
S&P 500 Index fund (BGI) ^{††}	up to 0.67%	0.4%	1.7%	-7.4%	7.8%
CDA Income Funds					
Bond and Mortgage fund (Fiera)	up to 0.99%	4.0%	5.3%	5.7%	6.4%
Fixed Income fund (McLean Budden) ^{†7}	up to 0.97%	9.3%	6.9%	7.1%	7.8%
CDA Cash and Equivalent Fund					
Money Market fund (Fiera)	up to 0.67%	1.8%	2.0%	2.6%	3.5%
CDA Growth and Income Funds					
Balanced fund (PH&N) ^{†8}	up to 1.20%	11.5%	7.3%	-0.7%	7.2%
Balanced Value fund (McLean Budden) ^{†9}	up to 0.95%	11.0%	9.0%	5.4%	9.4%

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: ¹Trimark Canadian Fund, ²PH&N Dividend Income Fund, ³KBSH Special Equity Fund, ⁴KBSH US Equity Fund, ⁵Trimark Fund, ⁶Templeton Global Stock Trust Fund, ⁷McLean Budden Fixed Income Fund, ⁸PH&N Balanced Pension Trust Fund, ⁹McLean Budden Balanced Value Fund.

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

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



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Pashley et al. (2001). The use of oxalate to reduce dentin permeability under adhesive restoration (AM J Dent 14:89-94) U.S. Patents: 5,406,529 and 6,506,055 MC-1074bb

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