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de dentisterie restauratrice et de prosthodontie

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Dentisterie esthétique**

**Practice Management /  
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## MESSAGE FROM THE GUEST CO-EDITOR

# Esthetic Dentistry: It's More than Just “White Filling”

Dentistry has been such a dynamic profession in all disciplines that it's become quite a daunting task to stay abreast of the changes. To complicate matters further, patient expectations for optimal esthetics continue to increase. It's important that we as dentists do not succumb to the pressures of what's simply “new and exciting” but take time to understand the science of the procedures and the properties of the materials we choose to use.

This special issue of *CJRPD* is focused on esthetic dentistry beyond the routine “white filling.” The articles presented describe protocols, techniques, and materials that may be incorporated into practice with predictability. The authors present a range of esthetic procedures involving direct and indirect restorations that illustrates how far esthetics has come. Dr. Harinder Sandhu, professor of periodontics at the University of Western Ontario describes various esthetic challenges that clinicians face with anterior gingival architecture. He describes appropriate classification of interdental papillae loss and various etiological factors. As with most comprehensive care in dentistry today, an interdisciplinary approach to diagnosis and management of papillae reconstruction is reviewed. Clinical and schematic diagrams allow us to better categorize these periodontal defects when treatment planning anterior esthetic cases.

Porcelain veneers are a commonly requested esthetic procedure from many patients who wish to improve their smile. Dr. Sandeep Walia and colleagues review the diagnosis, planning, and treatment of indirect porcelain veneers. The clinical case presented describes a common esthetic dilemma including anterior crowding and a discoloured single central incisor. Dr. Walia impresses upon us that through careful planning, material selection, and proper protocols, these cases can be managed with highly predictable success. The clinical case report involves gingival recontouring and reviews the process of preparation, impressioning and treatment of the teeth and restorations for successful placement of the final porcelain veneers. Selective reduction using a putty matrix from a diagnostic wax-up shows how one can keep these protocols as minimally invasive as possible.

With the fast changing world of dental materials, it's important to have an understanding of the material choices available for some of the newer products. Dr. Jack Griffin and colleagues explain the physical properties of dental zirconia. With the demand for higher esthetics, dental zirconia has become a new alternative to metal-free esthetic dentistry. Dr. Griffin discusses the chemistry behind zirconia cementation and introduces some new concepts on



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## MESSAGE FROM THE GUEST CO-EDITOR

surface treatments of zirconia to facilitate bonding. The article also shows a clinical case of a fixed zirconia bridge to replace a recently extracted tooth.

Dr. Marcos Vargas reviews the key elements required to conservatively restore the anterior dentition with direct composites. As our patients continue to demand higher esthetics while being sensitive to finances, it's important to understand how one can achieve their goals with direct composites. Dr. Vargas provides a detailed case report on a functional and esthetic anterior restoration that is commonly seen in every day practice. He demonstrates a step-by-step and predictable approach to incorporate into your esthetic protocols immediately.

With the obvious challenges in immediate implant placement in the esthetic zone, Dr. Robert Margeas demonstrates a technique of immediate extraction, placement, and provisionalization. His clinical case report reviews the details of utilizing the natural crown of the extracted tooth to serve as a provisional on the immediate implant. Through careful atraumatic extraction to management of the soft tissue complex, Dr.

Margeas provides a great protocol to eliminate the need of a removable prosthesis while preserving hard and soft tissue in the esthetic zone.

As with all aspects of private practice, dentists are not immune to the challenges of running a business and being a human resources manager. Jo-Anne O'Connor-Webber is a practice management consultant who presents the first of a series of articles related to the business side of dentistry. Through her experience, we hope to provide our readers with some guidance to help their practices improve beyond the clinical aspects. Her initial article raises some introspection by asking the practice owner to define what style of practitioner they are or wish to be. Creating strong leadership skills and hiring a good group of team players is the cornerstone of a successful practice.

The evolution of new materials in dentistry is a direct result of the pressures of our patients to achieve a great and long-lasting smile. Function and form fit hand in hand and we are challenged to strive and bring the best to each and every situation. Esthetics is no longer solely an art, but in order to provide

predictability requires a healthy balance of science. We have the ability to create highly esthetic restorations for our patients by thoughtful diagnosis, treatment planning, and material selections. Without each component, we are simply just placing a "white filling." I trust this issue will provide you more tools in your arsenal to make esthetics even more predictable and enjoyable.

Thank you to all our authors for their contributions to the education of our readership. I'd like to acknowledge Dr. Hubert Gaucher for his tireless efforts in leading this journal to new heights. On behalf of our editorial team at *CJRDP*, thank you for your growing support and happy reading!

*Dr. Paresh Shah  
Guest Co-Editor*



## MESSAGE DU CO-RÉDACTEUR INVITÉ

# Dentisterie esthétique : « C'est plus qu'une obturation blanche »

La dentisterie est devenue une profession tellement dynamique dans toutes les disciplines qu'il est parfois déconcertant de suivre tous les changements. Les attentes des patients pour une esthétique optimale continue d'augmenter, ce

qui vient compliquer les choses. Il est important pour nous en tant que dentistes de ne pas succomber aux pressions de ce qui est « nouveau et captivant », mais plutôt de prendre le temps de comprendre la science des interventions et les propriétés des

matériaux que nous choisissons d'utiliser.

Ce numéro spécial du *JCDRP* est consacré à la dentisterie esthétique au-delà de « l'obturation blanche » courante. Les articles présentés

décrivent des protocoles, des techniques et des matériaux qui peuvent faire partie de la pratique. Les auteurs présentent plusieurs interventions esthétiques de restauration directe et indirecte qui illustrent bien l'évolution de l'esthétique dentaire.

Le D<sup>r</sup> Harinder Sandhu, professeur de parodontie à l'University of Western Ontario décrit divers enjeux esthétiques auxquels les cliniciens doivent faire face avec l'architecture gingivale antérieure. Il décrit la classification de la perte des papilles inter-dentaires et divers facteurs étiologiques. Comme avec la plupart des soins de santé intégrés en dentisterie de nos jours, une approche interdisciplinaire au diagnostic et à la reconstruction des papilles est passée en revue. Des schémas cliniques nous permettent de mieux classer ces imperfections parodontales lorsqu'il s'agit de planifier le traitement esthétique de ces cas.

Les patients réclament souvent des facettes en porcelaine pour embellir leur sourire. Le D<sup>r</sup> Sandeep Walia examine le diagnostic, la planification et le traitement des facettes indirectes en porcelaine. Le cas clinique présenté décrit un dilemme esthétique fréquent, notamment le chevauchement des dents antérieures et la décoloration d'une seule incisive centrale. Le D<sup>r</sup> Walia nous fait valoir que par une planification adéquate, la bonne sélection de matériaux et les protocoles appropriés, ces cas peuvent être traités avec succès. Ce rapport de cas clinique comprend le rétablissement du contour gingival et passe en revue le processus de préparation, de prise d'empreinte et le traitement des dents et les restaurations pour la pose réussie de facettes en porcelaine. La réduction sélective en utilisant une matrice de modelage d'un modèle en cire diagnostique montre comment on peut garder ces protocoles aussi peu invasifs que possible.

Comme les matériaux dentaires évoluent rapidement, il est important de bien comprendre les choix de matériau disponible pour certains des nouveaux produits. Le D<sup>r</sup> Jack Griffin explique les propriétés physiques du zircone. Avec le demande d'une esthétique plus raffinée, le zircone est devenue la nouvelle solution de rechange

pour les restaurations sans métal de la dentisterie esthétique. Le D<sup>r</sup> Griffin aborde les principes chimiques de la cimentation du zircone pour faciliter le scellement. L'article traite également d'un cas clinique d'une extraction de dent remplacée par un pont fixe en zircone.

Le D<sup>r</sup> Marcos Vargas examine les éléments clés requis pour restaurer une dentition antérieure avec des composites directs. Comme nos patients continuent de demander une esthétique supérieure sans toutefois laisser un trou dans leur budget, il est important de comprendre comment on peut atteindre le but avec les composites directs. Le D<sup>r</sup> Vargas nous présente un rapport de cas détaillé d'une restauration fonctionnelle et esthétique des dents antérieures, restauration que l'on voit dans la pratique de tous les jours. Il donne une approche par étape et prévisible à incorporer dans vos protocoles esthétiques immédiatement.

Avec les enjeux évidents de la pose d'implants dans la zone esthétique, le D<sup>r</sup> Robert Margeas démontre une technique d'extraction-implantation simultanée avec mise en charge. Son rapport de cas clinique revoit les détails d'utiliser la couronne naturelle de la dent extraite comme mise en charge sur l'implant immédiat. De l'extraction sans traumatisme à la gestion des tissus mous, le D<sup>r</sup> Margeas nous fournit un protocole pour éliminer le besoin d'avoir une prothèse amovible tout en préservant le tissu dur et mou dans la région.

Comme avec tous les aspects de la pratique privée, les dentistes ne sont pas à l'abri des enjeux que comportent leur cabinet et le fait qu'ils doivent être également responsables des ressources humaines. Jo-Anne O'Connor-Webber, conseillère en gestion de cabinets dentaires, présente un premier article d'une série sur la gestion d'un cabinet dentaire. Grâce à son expérience, nous espérons donner à nos lecteurs certains conseils qui pourront les aider à améliorer leur pratique au-delà des aspects cliniques. Son premier article demande aux lecteurs de faire une introspection et de déterminer le style de clinicien qu'ils sont ou qu'ils désirent être. Le fondement d'une pratique réussie consiste à créer des compétences en leadership et

d'embaucher une excellente équipe.

L'évolution de nouveau matériel en dentisterie découle directement des pressions exercées par nos patients qui veulent avoir un beau sourire. La fonction et la forme vont de pair et nous sommes mis au défi d'obtenir les deux dans chacun des cas. L'esthétique n'est plus seulement un art, mais pour qu'elle soit prévisible, la science doit être de la partie. Nous avons la possibilité de créer des restaurations très esthétiques pour nos patients grâce au diagnostic réfléchi, à un bon plan de traitement et au bon choix de matériau. Sans chaque élément, nous ne faisons qu'une « obturation blanche ». J'espère que ce numéro vous fournira plus d'éléments dans votre boîte à outils pour rendre l'esthétique dentaire encore plus prévisible et agréable.

Nous remercions tous nos auteurs pour leur contribution à la formation de nos lecteurs. J'aimerais remercier le D<sup>r</sup> Hubert Gaucher pour son travail inlassable à vouloir porter ce journal à de nouveaux sommets. De la part de l'équipe de rédaction du *JCDRP*, je vous remercie de votre soutien et vous souhaite bonne lecture!

*D<sup>r</sup> Paresh Shah  
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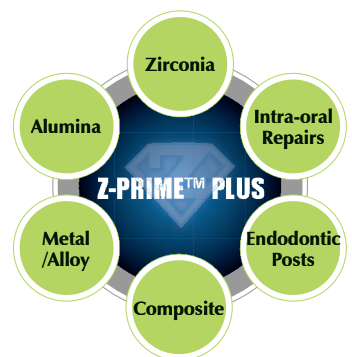
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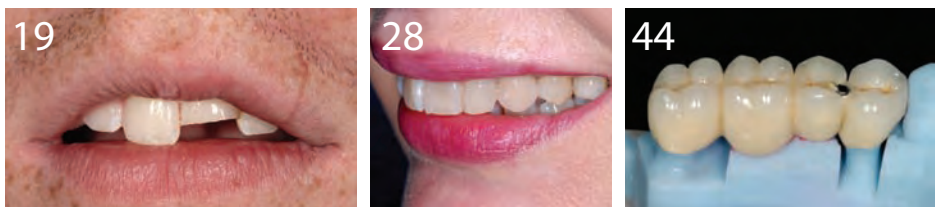
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*Due Date for Submissions: May 3rd, 2010 / Soumissions 3 mai 2010*

### SUMMER ISSUE: Dental Research / PARUTION ÉTÉ: Recherche dentaire

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*Due Date for Submissions: August 3rd, 2010 / Soumissions 3 août 2010*

### FALL ISSUE: Occlusion / PARUTION AUTOMNE: Occlusion

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*Due Date for Submissions: November 1st, 2010 / Soumissions 1 novembre  
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# Connectivity and Teamwork

From its very inception, the Canadian Academy of Restorative Dentistry and Prosthodontics (CARDP) has based its operation on connectivity and teamwork. Such an undertaking evolved out of need as two academies (CARD and CAP), founded in the '60s, merged and co-founded CARDP in the early '90s. Both organizations consolidated and bestowed their strong ethic of excellence and their volunteer-based memberships for the greater benefit of our profession.

CARDP has structured and implemented a Communications Committee whose purpose is to substantiate our academy's four main objectives. These objectives promote quality restorative dentistry and prosthodontics for the good of patients, dentists, dental education, and continuing education. Our academy can also boast of a distinguished tradition of excellence in our Annual Scientific Meeting, which is held in various cities throughout Canada. This year's meeting, our 48th, to be held in Calgary, will not be an exception.

In the spring of 2008, the inaugural issue of the *Canadian Journal of Restorative Dentistry and Prosthodontics (CJRDP)* became the official publication of CARDP. Members contribute their talents, time, and efforts to the *Journal's* editorial board, as well as providing varied and engaging articles, all in keeping with our mentality of teamwork. For instance, *CJRDP* recently profited from the collaboration of Dr. Maureen Andrea as guest editor of the laser dentistry issue, and it now welcomes Dr. Paresh Shah as co-editor of this esthetics issue. These colleagues epitomize the teamwork that underpins our academy and set an example for others to join the *Journal's* editorial team.

Moreover, guest correspondents from the academic community, private practice, the consulting sphere, and industry are generously providing articles that broaden the scope of our topics and transmit state-of-the-art information pertinent to our daily practice, as acknowledged in our *Journal's* recent membership-based survey feedback. Articles are graciously offered to our readership without pecuniary compensation to their contributors. In so doing, these benefactors are upholding our academy's loftiest commitment to the mission of our profession.

On top of everything, Andrew John Publishing Inc. (AJPI, in Dundas, Ontario) has consistently provided guidance and substantial resources for the growth of *CJRDP*. As each new issue will focus on a theme, representatives of the industry are invited to come on board and support CARDP through our official publication. Each issue reflects the continued connectivity between the editorial board, AJPI, and the industry.

The 2010 Winter Issue marks the launching of its first e-journal. Cyberspace connectivity is now at our doorstep; I expect that the demand for such connectivity will increase exponentially as dentists are introduced to and use the added value of blogs, online demos, and, at some point, teledentistry. Due to CARDP's networked nature and vast geography, there are very specific advantages to using and fostering cyberspace connections within our community. Will the industry be with us in cyberspace? There is no doubt in my mind! As CARDP leads with a unique e-journal and inevitably moves toward more Internet services and features, membership in our academy will become an imperative. How can we attain this visionary level

of connectivity? Quite simply by turning to the teamwork principles and connectivity that have inspired dentists since the '60s to be a part of the most progressive dental organization in Canada: CARDP!

On another note, back in 1976, when I was a young faculty member at Laval University, a gentleman phoned me to set up a meeting to discuss dental technologies. I was impressed with his excellent French and somewhat intrigued by all of this since he was based in Ontario. The tall and elegantly groomed man entered my makeshift cardboard-siding office (our building was under reconfiguration) and proceeded to engage me in a conversation about dental materials. He did so by first seeking out my clinical goals and ever so gently providing recommendations that were not only sound but cutting edge. That conversation marked the beginning of a lifelong professional relationship and collaboration with Mr. Henri Rotsaert, of Hamilton, Ontario, in my restorative and prosthodontic pursuits. The recent passing of Henri, an honorary member of our academy and a gifted laboratory technologist as well as a maverick entrepreneur, leaves the dental community deeply saddened but grateful to have had the privilege of working with him. I respectfully submit that Henri exemplified connectivity and teamwork leadership. On behalf of our editorial board, membership, and readers, I wish to express to Mr. Paul Rotsaert, section editor, and to his family, our heartfelt condolences.

*Dr. Hubert Gaucher*  
Editor-in-Chief





# Connectivité et travail d'équipe

Dès sa formation, l'Académie canadienne de dentisterie restauratrice et de prosthodontie (ACDRP) a fondé son fonctionnement sur la connectivité et le travail d'équipe. Une telle entreprise est née du besoin de deux académies (CARD et CAP), fondées dans les années 1960, qui se sont fusionnées pour devenir l'ACDRP au début des années 1990. Les deux organisations ont intégré leurs principes éthiques d'excellence et regroupé leurs membres bénévoles pour le plus grand bienfait de notre profession.

L'ACDRP a mis sur pied un comité de communications dont le but est de valider les quatre objectifs principaux de l'Académie. Ces objectifs font la promotion de la dentisterie restauratrice et de la prosthodontie pour le bien-être des patients, des dentistes, de la formation dentaire et de l'éducation continue. Notre Académie peut aussi se vanter d'une tradition d'excellence à notre Congrès annuel qui a lieu dans diverses villes à travers le Canada. Cette année, le 48<sup>e</sup> Congrès qui se tiendra à Calgary ne sera pas une exception à cette règle.

Au printemps de 2008, le numéro inaugural du *Journal canadien de dentisterie restauratrice et de prosthodontie (JCDRP)* est devenu la publication officielle de l'ACDRP. Les membres qui ne manquent pas de talents ont consacré leur temps au comité éditorial du *Journal*, et y ont contribué en rédigeant des articles variés et intéressants tout en tenant compte du travail d'équipe. Par exemple, le *JCDRP* a profité de la collaboration du D<sup>r</sup> Maureen Andrea, en tant que rédactrice invitée pour traiter la question de l'emploi du laser en dentisterie. Nous souhaitons maintenant la bienvenue au D<sup>r</sup> Paresch Shah comme co-rédacteur pour ce numéro sur l'esthétique dentaire. Ces collègues personnifient le travail d'équipe qui est à la base de notre Académie et donnent l'exemple aux

autres qui veulent se joindre à l'équipe éditoriale du *Journal*.

De plus, les correspondants invités de l'Académie, de la pratique privée, du monde des consultants, et de l'Industrie contribuent généreusement à des articles qui élargissent la portée de nos sujets et transmettent l'information de pointe pertinente à notre pratique quotidienne, comme on a pu le constater dans les résultats du dernier sondage des membres mené par le *Journal*. Les articles sont rédigés gratuitement pour nos lecteurs. Ces bienfaiteurs confirment notre engagement des plus noble à la mission de notre profession.

De plus, Andrew John Publishing Inc. (AJPI, à Dundas en Ontario) nous a bien encadrés et nous a fourni les ressources nécessaires pour aller de l'avant avec la publication du *JCDRP*. Comme chaque nouveau numéro se concentrera sur un thème, les représentants l'Industrie sont invités à se joindre à nous et à offrir leur soutien à l'ACDRP par l'intermédiaire de notre publication officielle. Chaque numéro correspond à notre connectivité entre l'équipe de rédaction, AJPI et l'Industrie.

Le numéro Hiver 2010 marque le lancement du premier journal électronique. Le cyber-espace est maintenant à notre portée. Je m'attends à ce que la demande pour une telle connectivité augmente de manière exponentielle au fur et à mesure que les dentistes utilisent les blogs, les démonstrations en ligne et, à un moment donné, la télédentisterie. En raison de la nature de réseautage de l'ACDRP et de notre vaste géographie, il existe des avantages spécifiques à utiliser et à encourager les connexions du cyber-espace dans notre communauté. Est-ce que l'Industrie sera des nôtres dans le cyberspace? Je n'en doute aucunement! À mesure que l'ACDRP tire avantage de son journal électronique unique et qu'elle utilise

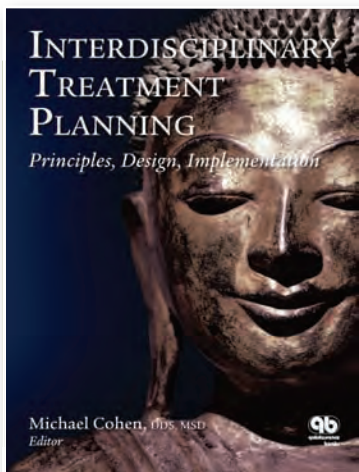
de plus en plus les services Internet, en devenir membre deviendra une nécessité. Comment pouvons-nous atteindre ce niveau visionnaire de connectivité? Très simplement, en adoptant les principes du travail d'équipe et de connectivité qui ont inspiré les dentistes depuis les années 60 à faire partie de l'association dentaire la plus progressive au Canada : l'ACDRP.

Pour changer de sujet, en 1976 lorsque j'étais un jeune professeur à l'Université Laval, j'ai reçu un appel d'un homme qui voulait prendre rendez-vous avec moi dans le but de discuter des technologies dentaires. J'ai été impressionné par son excellent français et un peu intrigué puisqu'il vivait en Ontario. Grand et élégant, il m'a rendu visite dans mon bureau improvisé à murs cartonnés (notre édifice était en rénovation) et a engagé la conversation au sujet des matériaux dentaires. Il m'a d'abord demandé quels étaient mes objectifs cliniques, puis m'a fait ses recommandations qui étaient non seulement pointues, mais aussi de fine pointe. Cette conversation a marqué le début d'une longue relation professionnelle et une collaboration avec M. Henri Rotsaert de Hamilton. C'est avec beaucoup de chagrin que nous venons d'apprendre le décès d'Henri, membre honoraire de notre Académie, technologue de laboratoire doué et entrepreneur aguerri. Nous sommes heureux d'avoir eu le privilège de travailler avec lui. Henri était l'exemple parfait de la connectivité et du travail d'équipe. Au nom de l'équipe éditoriale, des membres et des lecteurs, je veux transmettre à M. Paul Rotsaert et à sa famille, nos plus sincères condoléances.

*Hubert Gaucher*  
Rédacteur en chef



# Textbook Review



## Interdisciplinary Treatment Planning By Dr. Michael Cohen, DDS, MSD, Editor



Reviewed by Dr. Paresh Shah

Dr. Michael Cohen is a practising periodontist in Seattle, Washington, who founded the Seattle Study Club 16 years ago. This book is his brainchild and his goal was to help facilitate the clinician's treatment planning skills in a *disciplined* manner. By discipline, Dr. Cohen hopes that clinicians will take the time to use a "sound rationale" for each step chosen in the treatment planning process based on clinical and scientific experience.

Dr. Cohen has assembled a stellar cast of contributing clinicians to provide an insight into their perspectives of comprehensive treatment planning. They each serve as contributing authors to introduce key principles that they feel are essential to case planning and follow it up with clinical examples to substantiate these principles.

Each chapter is intended to work independent of one another, but at the end collectively works to stimulate thought and insight for comprehensive case planning. Every chapter presents a clinical case in three parts. The "Clinical Treatment Planning" section presents all the diagnostic information required for the reader to treatment plan the case themselves or in a group. Readers are encouraged at this point to sit down and develop their own comprehensive treatment plan based on the presented information. The next section is the "Proposed Treatment Plan" presented by the treating clinicians along with the patient's input. The final section, "Active Clinical Treatment" presents description of the treatment performed along with the post-treatment images and radiographs.

The entire book is a collection of comprehensive treatments performed by a group of skilled restorative dentists and specialists that represent all most disciplines of dentistry. The reader will receive commentary from not only the restorative dentist, but also the specialty perspectives in endodontics, periodontics, oral surgery, and prosthodontics. The book is carefully crafted and although some readers may chose different methods to treat a similar case in their practice, it's the fundamental principles of case planning that Dr. Cohen and the authors are trying to get across as their message. This textbook can serve as a great resource for students, professors and practicing clinicians.





## Message from the Membership Committee / Message du Comité des membres

An impressive group of new members were welcomed into the academy at the annual meeting luncheon in Montreal this past September. They are Jonathan Adams from Victoria, BC; Richard Beauchamp and Karen Isbister both from Edmonton, AB; Martin Brochu from Ottawa, ON; Blaine Cleghorn from Halifax, NS; Elio Felice from Hamilton, ON; Les Ennis and Grant Woo both from White Rock, BC; Teresa Godinho from Vancouver, BC; Cameron MacLean from Victoria, BC; and Kar-Lai Yuen from New Westminster, BC. We look forward to their participation in the organization and getting to know them better.

So far this fall the committee has six membership applications to process. We would like lots more! The academy has simplified the application procedure so that it is not nearly as onerous as it once was. To become an Active Member the requirements are simple. (1) Attend a meeting (2) Complete the application, which can be downloaded off our website at [www.cardp.com](http://www.cardp.com). Membership is by invitation so as members we need to encourage our colleagues to join. Friends from study clubs and dental societies would benefit from belonging to our outstanding organization. To share the wealth of talent and expertise I encourage all members to bring a guest to Calgary. I'm sure they won't be disappointed.

A reminder to our Active Members. Apply for fellowship status when you have acquired your 10 points. Again check the website for the application.

Fellow members David Cowan from Toronto, ON and Dan Macintosh from Chester, NS have now distinguished themselves as Life Members. Congratulations to them both!

## New Members Profiles / Profils Nouveaux Membres

**Name / Nom:** Rick Beauchamp

**Education / Éducation:** DDS 1972 University of Alberta

**Teaching Activities / Enseignement:** Part time clinical instructor Department of Periodontics, Faculty of Dentistry, University of Alberta 1974–1982

**Dental Practice / Pratique dentaire:** General practice 1972–present, Edmonton Alberta.

**Affiliations:** Pierre Fauchard Society, International College of Dentists, American College of Dentists, Alberta Dental Association, Canadian Dental Association.

**Family / Famille:** Wife: Elizabeth (Betty), Sons: John and Paul, Granddaughter: Lauren.

**Hobbies / Passe-temps favori:** Golf, skiing, cycling.



**Name / Nom:**  
Blaine Murray Cleghorn

**Education / Éducation:** DMD (1979), University of Manitoba; MS (1987) (Oral Biology), University of Manitoba.

**Teaching Activities / Enseignement:**  
Dental Anatomy & Occlusion

**Dental Practice / Pratique dentaire:**  
Assistant Dean – Clinics, Dalhousie University.

**Affiliations:** Canadian Dental Association; Nova Scotia Dental Association; Academy of Sports Dentistry; Fellow – Pierre Fauchard Academy; Fellow – American College of Dentists; OKU Dental Honour Society.

**Family / Famille:** Wife: Joan, Kids: Brett and Scott.

**Hobbies / Passe-temps favori:** Jogging.

## More Images from Montreal 2009







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# Join us in Calgary this October!



2010 Annual Scientific Meeting  
October 14<sup>th</sup> - 16<sup>th</sup>, Calgary, Alberta

## Meeting Theme: "Real World Dentistry 2010 and Beyond"

Welcome to Calgary, a Message from the CARDP President



It is my privilege to serve as President of The Canadian Academy of Restorative Dentistry and Prosthodontics for 2010. Over the years I have watched the executive and the standing committees shape our Academy into the organization that it is today. Every year, as the Academy changes its conference venue, the local organizing committee generates a scientific and social program that highlight the attributes of that area. Through the work of the regional councillors and committees and the publication of our Journal we have become a truly national organization.

Our Canadian Journal of Restorative Dentistry & Prosthodontics has placed our Academy in the forefront of Canadian dentistry. The development of the Journal was made possible through the efforts of dedicated leaders such as Hubert Gaucher, Editor-in-Chief and John Birkby, group publisher. It has been said that leaders are not made by following the footsteps of others but by creating their own. The hard work of the communication committee and the visionaries who created the Journal, then carried it to publication, deserve our most sincere congratulations and gratitude.

It would be remiss of me not to make a special note of thanks to David Alexander and Glenn Richardson for their administrative assistance. David and Glenn have been instrumental in developing all those fine points in organization that make our Academy run smoothly.

This year I have the honour to preside over our Annual Meeting in Calgary, Alberta. Ed McIntyre and his committee have developed a scientific program that will be provocative and stimulating for all the attendees. I extend a most sincere invitation to all members and guests to attend the scientific program, and to renew or make new friendships from across this great country. The social portion of the program is designed to stimulate a camaraderie that can last a lifetime.

On behalf of the entire CARDP Executive, myself and Dianne, I wish you good health and prosperity in the coming year.

Sincerely,

Vernon Shaffner

### Social Activities

Our social activities promise to be as exciting as in past Years, the planning is ongoing and will be announced soon. Join us Thursday evening for the Opening Reception and get reacquainted with old friends and make new ones! Friday's companions/partners program will offer the most spectacular scenery on a trip to Kananaskis and Canmore. Friday Night will offer up a traditional Western theme and the President's Gala will feature one of the regions Hottest Dance Bands!



### Friday Feature Speaker

Dr. David Garber is one of the internationally recognized multidisciplinary educators well-known as "Team Atlanta." Dr. Garber is the recipient of "The 2005 Gordon J. Christensen Lecturer Recognition Award," "The American College of Prosthodontics Distinguished Lecturer Award," "The Northeastern Periodontal Society Isador Hirschfeld Award for Clinical Excellence," "The Greater New York Academy of Prosthodontics Distinguished Lecturer Award," and "The David Serson Medal of Research."



He is a past president of the American Academy of Esthetic Dentistry and has served on the boards of both the AAED and the American Academy of Fixed Prosthodontics.

Dr. Garber is dual trained clinician and professor in the Department of Periodontics as well as in the Department of Oral Rehabilitation at the Medical College of Georgia. He is a Clinical Professor in the Department of Prosthodontics at Louisiana State University and a Clinical Professor in the Department of Restorative Dentistry at the University of Texas in San Antonio.

He is past editor of the *Journal of Esthetic Dentistry*, past president of the AAED, and co-author of *Porcelain Laminate Veneers, Bleaching Teeth, Porcelain and Composite Inlays and Onlays, and Complete Dental Bleaching*, and has published in excess of 60 articles and textbooks chapters.

### Saturday Speaker's

Dr. Kevin Lung, Dr. Glen Johnson, Dr. Robert Miller, Mr. Naoki Aiba

More Information on our Speakers and the Thursday, Hands on Course coming in the Next Issue. Also visit [www.cardp.ca](http://www.cardp.ca) for updated information and registration coming soon!

### A Message from the Conference Chair

I take this opportunity to invite you to the Canadian Academy of Restorative Dentistry and Prosthodontics Annual Meeting which is to be held in Calgary, Alberta October 13 - 16, 2010. Many of you have probably heard Calgary referred to as "Cow Town", but, if you are hoping to see cows, you might be disappointed. Calgary is a very cosmopolitan city that has experienced tremendous growth over the past decade.



The Westin Calgary Hotel, which is the venue for our meeting, was newly renovated and redecorated in the past year and is truly first class. I know that you will find it very comfortable as it offers all the amenities to make your stay enjoyable.

Our Meeting will begin on Thursday, October 14<sup>th</sup> with a course presented by Naoki Aiba, CDT, titled: Dental Photography for Dentists - Laboratory Communication. Mr. Aiba is not only an excellent dental technician but also an award winning professional photographer.

For those who might like to take part in a little more vigorous activity we are planning an adventure tour on Thursday all can participate in. Stay tuned for more information to be announced in coming weeks. Thursday evening we will have our "meet and greet evening" that will feature food, drink and an opportunity to mingle with friends and exhibitors.

Our scientific portion of the Meeting will begin on Friday and will feature Dr. David Garber who will be presenting: Real World Dentistry - 2010 and Beyond. Friday evening, dress up in your western duds for a casual evening featuring a barbeque, calf roping, bull riding and some good old western dancing. The Scientific Meeting on Saturday will feature four presentations in the morning and table clinics in the afternoon. As usual, the Meeting will be "capped" by the President's Ball that will feature fine dining and a great orchestra to dance the night away.

For those of you who are planning on coming a little early and perhaps spending Thanksgiving in the mountains, the Banff and Lake Louise areas can be beautiful at that time of year. But be prepared for all seasons during that period and don't forget to bring some warm clothing, just in case. I hope that all of you will be able to attend the seventeenth Annual Meeting of our Academy.

Ed McIntyre  
Annual Meeting Chair

Check the CARDP website for ongoing updates on the Scientific Meeting!



Get Meeting Info and Register Online at [www.CARDP.ca](http://www.CARDP.ca)  
The Westin Calgary Hotel Reservations: 1-403-266-1611

# Soyez des-nôtres à Calgary en octobre prochain!



Congrès annuel 2010  
14 au 16 octobre, Calgary, Alberta

## Thème du congrès: La dentisterie pragmatique: aujourd'hui et au-delà

Bienvenue à Calgary - Un Message du Président de l'ACDRP



Je suis privilégié de présider pour 2010 sur l'Académie canadienne de dentisterie restauratrice et de prosthodontie. Au fil des années, j'ai noté le progrès de nos comités dans l'avancement de notre Académie. À chaque congrès, alors que les rencontres ont lieu dans différentes villes, les programmes scientifiques et sociaux reflètent la saveur locale et les attributs de l'endroit. Grâce à la contribution des conseillers et comités régionaux, ainsi qu'à la publication de notre Journal, nous sommes devenus un organisme véritablement national.

Notre Journal canadien de dentisterie restauratrice et de prosthodontie a positionné notre Académie parmi les chefs de file de la médecine dentaire au Canada. La mise en place du Journal a été rendue possible grâce aux efforts et au dévouement de leaders tels Hubert Gaucher, rédacteur-en-chef, et John Birkby, éditeur. On dit d'un leader qu'il ne suit pas les traces des autres mais qu'il crée ses propres traces. L'implication du comité des communications et des visionnaires qui ont conçu ce Journal, qui l'ont ensuite mené jusqu'à sa publication, méritent notre gratitude et nos félicitations.

Je tiens à souligner l'apport de David Alexander et Glenn Richardson pour leur assistance administrative. David et Glenn jouent un rôle considérable dans la bonne démarche de notre Académie.

Cette année, j'ai l'honneur de diriger notre congrès à Calgary. Ed McIntyre et son comité ont produit pour nous un programme scientifique à la fois stimulant et provocateur. J'incite donc tous nos membres et invités à assister à cette rencontre annuelle et à renouer avec leurs amis issus de tous les coins de notre magnifique pays. N'oubliez pas que la partie sociale du programme est élaboré dans le but de stimuler une camaraderie qui dure souvent toute une vie.

Au nom du conseil d'administration de l'ACDRP, de Dianne et moi-même, je vous souhaite santé et prospérité dans cette nouvelle année.

Sincèrement,

Vernon Shaffner

### Programme Social

Comme toujours, nos activités sociales sauront vous séduire. Leur planification progresse et elles vous seront bientôt annoncées. La soirée d'Ouverture du jeudi vous permettra de renouer avec vos anciens collègues et amis et de créer de nouveaux liens cordiaux. La sortie du vendredi étonnera les conjoints avec des paysages saisissants vers Kananaskis et Canmore. La soirée vous réserve un thème Western tandis que le Bal de fermeture du Président mettra en vedette un orchestre de danse des plus prisés de la région.



### Conférencier notoire du vendredi

Dr. David Garber est membre d'un groupe d'éducateurs multidisciplinaires reconnus internationalement sous l'appellation Team Atlanta. Il est récipiendaire de: 2005 Gordon J. Christensen Lecturer Recognition Award, American College of Prosthodontics Distinguished Lecturer Award, Northeastern Periodontal Society Isador Hirschfeld Award for Clinical Excellence, Greater New York Academy of Prosthodontics Distinguished Lecturer Award, et David Serson Medal of Research.



Il fut Président du American Academy of Esthetic Dentistry et siège au Conseil d'administration de celui-ci ainsi que American Academy of Fixed Prosthodontics. Dr. Garber oeuvre comme clinicien et professeur dans les départements de Parodontie et de Réhabilitation orale au Medical College of Georgia, dans le département de Prosthodontie à Louisiana State University et dans le département de Dentisterie restauratrice de University of Texas à San Antonio.

Il fut rédacteur du Journal of Esthetic Dentistry et co-auteur de Porcelain Laminate Veneers, Bleaching Teeth, Porcelain and Composite Inlays and Onlays, et Complete Dental Bleaching, et a publié plus de 60 articles et chapitres de manuels.

### Conférenciers du samedi

Dr. Kevin Lung, Dr. Glen Johnson, Dr. Robert Miller, Mr. Naoki Aiba

De plus amples renseignements sur les conférenciers et sur le cours pratique du jeudi sont à venir. Consultez [www.cardp.ca](http://www.cardp.ca) pour les mises à jour et l'inscription.

### Un message du président du congrès

Je profite de cette occasion pour vous inviter au congrès annuel de l'Académie canadienne de dentisterie restauratrice et de prosthodontie qui se tiendra à Calgary en Alberta du 13-16 octobre 2010. Certains d'entre vous avez peut-être entendu l'expression <Cow Town> pour surnommer Calgary, mais si vous croyez y voir des vaches, vous serez déçus. Calgary est une ville très cosmopolite qui a connu une croissance prodigieuse depuis une dizaine d'années.



Le Westin, qui sera notre lieu de rencontre, vient d'être rénové et décoré à neuf et s'avère un hôtel de première classe. Vous y trouverez tous les services et commodités pour rendre votre séjour des plus agréables. Notre congrès débutera le jeudi 14 octobre avec un cours présenté par Naoki Aiba, TDC, intitulé: «La photographie dentaire pour les dentistes – la communication laboratoire». M. Aiba est non seulement un technicien dentaire hors pair mais il est également un photographe professionnel primé.

Il y aura, le jeudi, un tour offert à ceux et celles qui ont le goût de participer à des activités un peu plus vigoureuses. Restez à l'écoute pour des informations qui vous seront diffusées dans les prochaines semaines. La soirée-rencontre de jeudi offrira breuvages et mets ainsi que l'occasion de se joindre à amis et exposants.

La portion scientifique du congrès commencera le lendemain matin avec Dr. David Garber qui présentera: «La dentisterie de la vraie vie – 2010 et au-delà». Vendredi en soirée, revêtez vous atours <cowboy> pour un festin Western, jeux de lasso, taureaux et de la bonne vieille danse carée.

Le samedi avant-midi introduira quatre conférenciers et, le même après-midi, les démonstrations cliniques. Comme toujours, cette journée sera couronnée par le Bal du président avec repas gastronomique et un orchestre de danse. Si vous pensez arriver avant le congrès pour profiter de la splendeur des montagnes de Banff et du Lac Louise, sachez que vous devez prévoir du temps froid alors apportez des vêtements en conséquence. J'espère que vous viendrez nombreux à ce dix-septième congrès annuel de notre Académie.

Ed McIntyre

Président du congrès

Vérifier le site internet pour les mises à jour continues sur les Réunions Scientifiques !

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Canadian Association of Restorative and Prosthodontic Dentists

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# Conservative Application of Resin Composites to Solve an Esthetic Problem

Marcos A. Vargas DDS, MS

## ABSTRACT

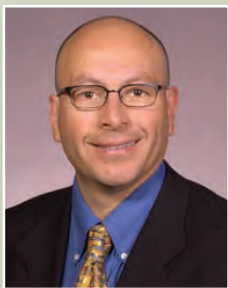
Direct bonded resin composite restorations provide the clinician with a conservative approach to the esthetic restoration of the anterior dentition. However, the clinician must fully understand resin composite materials and the techniques available to build restorations that replicate enamel and dentin in order to produce long lasting esthetic and functional restorations that defy detection and satisfy the most demanding patients.

This article reviews the step by step technique for the functional and esthetic restoration of an anterior tooth with a nanofilled resin composite material.

## RÉSUMÉ

Les restaurations en résine composite sont une approche conservatrice à la restauration esthétique des dents antérieures. Toutefois, le clinicien doit bien comprendre les matériaux de résine composite et les techniques pour que les restaurations soient une copie exacte de l'émail et de la dentine afin qu'elles soient esthétiques, fonctionnelles et durables et qu'elles ne puissent pas être détectées et qu'elles plaisent aux patients les plus exigeants.

Cet article examine étape par étape la technique de restauration fonctionnelle et esthétique d'une dent antérieure en utilisant une résine composite.



### *About the Author*

*Dr. Vargas is a professor in the Department of Family Dentistry at The University of Iowa, Iowa City, Iowa, USA.*

## Resin Composite Restorations

Resin composite materials have improved since their introduction in the 1960s. New formulations and breakthroughs in particle technology have improved not only their physical properties but also handling characteristics and optical properties. This improvement, has allowed for the material to be used in the restoration of both anterior and posterior teeth under widely varied situations.

In contrast to posterior restorations, patients are very demanding and expect esthetic restorations that defy detection in the anterior sector. This has placed a tremendous burden on the dental practitioner to create lifelike restorations on a daily basis.

The key to success in providing direct anterior lifelike restorations resides in the knowledge of three main components: (1) optical properties of the tissues to be restored – enamel and dentin; (2) the materials used to replace enamel and dentin – resin composites; and (3) the techniques that allow us to replace enamel and dentin with direct resin composites.

An image of a tooth can be summarized as the interaction of light with the dentin overlaid by enamel. More specifically, a portion of the incident light is reflected by enamel, allowing the shape of the tooth and its surface characterization to be seen. A portion of light will also penetrate the enamel and dentin. This light will then be scattered and reflected out. Thus, the shade of the tooth is the result of the interaction of light with a translucent enamel shade and an opaque dentin shade.

Current resin composites manufacturers

produce materials of various shades optically which are designed to replace enamel and dentin. The materials made to replace dentin are usually called “dentin,” “opaque,” or “opacious.” Materials made to replace enamel are called “enamel” or “body.” Additionally, manufacturers produce translucent materials to imitate translucent areas of enamel, these are called “incisal,” “translucent,” or “clear.” Regardless of the nomenclature used, the dental practitioner should be aware and know, in his/her own resin system, the intent of the manufacturer in order to use the material properly to imitate the layering of enamel and dentin.

Various techniques have been described in the dental literature to layer resin composites to achieve lifelike restorations. The principle is this: replace enamel with enamel-like materials and dentin with dentin-like materials.

## Case Presentation

A 23-year-old male with history of trauma presented for the treatment of a fractured anterior tooth. Clinical examination revealed the incisal third was fractured off the upper left central incisor with dentin exposure (Figure 1). Pulp response was positive, no pain to vertical or horizontal percussion and no swelling. A periapical radiograph was made and no signs of radicular fracture were noted (Figure 2).

The patient was highly concerned with maximal preservation of tooth structure but a highly esthetic restoration is a must for him. Advantages and disadvantages of direct resin composite restorations over indirect restorations were explained to the patient. He decided in favour of a resin composite restoration.

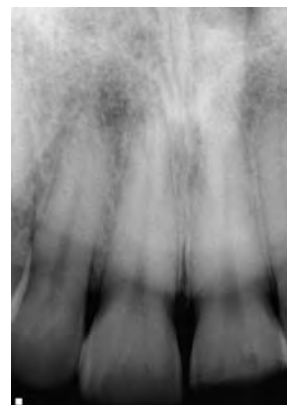


Figure 2. Periapical radiograph of upper central incisors.

Filtek Supreme Ultra (3M ESPE, St. Paul, MN), a nanofilled resin composite was selected to restore the central incisor. The material was selected because of its physical and esthetic properties, handling characteristics, and availability of a wide range of shades and opacities. This material is an improvement over its previous version, with fluorescent tooth like properties, enhanced polish retention and handling properties.

## Shade Selection

Prior to shade selection, the anterior teeth were cleaned with a slurry of pumice and a prophyl cup. The shade for the composite resin build-up was then determined using a custom shade guide made of the selected material. A basic shade A1 was selected from middle third of the fractured tooth (Figure 3). In order to replace dentin, an opaque and darker shade was selected, A2 Dentin; to replace enamel an A1 Enamel shade was selected; to simulate the translucent effect observed in the incisal third a translucent shade, CT, was selected.



A



B

Figure 1 A and B. Pre-operative view of fractured central incisor.



Figure 3. Shade selection using a custom shade tab made of the selected material.

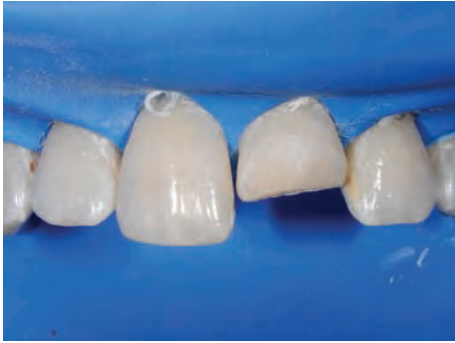


Figure 4. Cavity preparation.



Figure 5. Lingual matrix used to create the lingual enamel.



Figure 6. Lingual enamel increment

**Clinical Tip:** The middle third of the tooth is the best area to select the basic tooth shade.

**Clinical Tip:** A scalloped facial bevel facilitates the blending of resin composite onto tooth structure.

### Field Isolation and Cavity Preparation

The build up was performed under rubber dam isolation to ensure the control of moisture throughout the direct resin build-up. The required preparation design was facial and lingual bevelling of the remaining tooth structure, which would help conceal the transition line between the natural tooth structures and the resin materials upon placement and polymerization. A scalloped facial bevel served as a “functional-esthetic bevel,” which began slightly inside the dentin-enamel junction (DEJ) at a 60° angle, and disappeared towards the cervical area. The lingual bevel was a “functional bevel,” which was a 45° angle of the enamel thickness. The bevels were also extended through the interproximal areas for harmonious blending of the resin into these regions. Additionally, contouring disks were used to render the margin imperceptible (Figure 4).

### Composite Layering

After adhesive procedures, a small quantity of resin shade A1 Enamel was placed on the lingual bevel to form the lingual enamel for the build-up. Once this increment had been adapted to the lingual bevel to ensure a marginal seal, a previously fabricated matrix was then inserted. The material was spread over the matrix using a thin-bladed interproximal carver (IPC) instrument and smoothed with an artist sable brush. It was important to monitor the thickness of this layer, as an average thickness of 0.4 mm is required. A thinner increment could have resulted in a weak layer and fracture during subsequent layer placement (Figure 5).

**Clinical Tip:** Using a lingual matrix will facilitate finishing and occlusal adjustments.

The lingual enamel was cured for 20 seconds from the facial, the matrix was then removed and the increment cured for an additional 20 seconds from the palatal aspect (Figure 6). A thin metal strip was used then to permit the formation of the interproximal walls. Once in position, an increment of resin was placed against the strip and shaped with the IPC to the correct incisal embrasure, the sable brush was also used to smooth the surface of the build-up prior to light curing for 20 seconds. The procedure was then repeated, including the polymerization step, for the mesial aspect as well (Figure 7). This technique ensured proper proximal contour and proximal contact; the use of wedges was unnecessary and was avoided to prevent any potential tissue recession in this patient, who had a thin gingival biotype.

A dentin-like opacity shade, A2 Dentin, was applied for dentin replacement and feathered over the bevel to imperceptibly blend it over the tooth structure (Figure 8). Dentin lobes were then created and evaluated in the build-up of tooth #9 (Figure 9). Prior to polymerization, the “dentin” increment was



Figure 7. Proximal contacts obtained with enamel-like material.



Figure 8. Dentin replacement placed and blended over facial bevel.



Figure 9. Final appearance of dentin increment.





Figure 10. Clear Translucent material increment.



Figure 11. Final facial enamel increment.



Figure 12. Contouring and surface characterization.

evaluated for proper thickness. An adequate amount of space should remain for the final “enamel” increment. A proper translucent effect in the incisal third of the restoration was accomplished by adding a layer of translucent material, Clear Translucent (CT), in between and in front of the dentinal lobes and smoothed with the sable brush (Figure 10).

**Clinical Tip:** The dentin replacement should extend and overlap the facial bevel for maximum blending and masking.

The final enamel increment of composite, facial enamel, shade A1 Enamel, was added to the facial surface in one increment of resin. The thin-bladed IPC instrument was used to produce the desired facial embrasures and to prevent excess material from accumulating in the cervical and interproximal regions. The side of the brush was used to create developmental grooves observed in the natural dentition (Figure 11). This final increment of “enamel” resin was polymerized for 40 seconds.

### Contouring and Polishing

While the value of the restoration has the greatest effect on success, ensuring proper shape and facial anatomy is also important for a successful restoration. The incisal length was evaluated and any adjustments were made with a polishing disk. Incisal embrasures were evaluated and consistently opened distally to match the mesial embrasure of the canine. The facial embrasures and facial crest of the contour were evaluated from an incisal view, and the cervical embrasures and proximal contact were evaluated and modified as necessary. A tapered diamond bur was used to produce surface characterizations to imitate natural tooth surface (Figure 12). Polishing cups were sequentially used to impart the restoration with an enamel like lustre polish (Figure 13). The proximal areas were polished with thin plastic strips (i.e., Elite, GC America, Alsip, IL) (Figure 14). The rubber dam was removed and the occlusion was verified in centric occlusion followed by protrusive and lateral movements (Figure 15).

**Clinical Tip:** Make sure the patient understands that immediately after rubber dam removal the teeth are dehydrated and a shade evaluation should be done 24 hours later.

The patient returned two weeks postoperatively for a follow-up examination, at which time no problems were discovered and the patient confirmed his satisfaction with the smile enhancement achieved with the direct resin procedure (Figure 16 and 17).

When contemporary resin materials are used for the restoration of the anterior maxilla, several direct techniques can provide significant opportunities for aesthetic enhancement. Freehand techniques offer a great deal of creativity to the attending clinician and have been demonstrated throughout the dental literature. The lingual matrix technique can be extremely effective in guiding the clinician’s reproduction of the ideal proportions, shapes, and anatomy



Figure 13. Polishing cup to smooth surface.



Figure 14. Proximal contouring and polishing with strips.



Figure 15. Immediate post-operative view.



Figure 16. Two weeks post-operative view.



Figure 17. Proper contour, surface characterization, and shade obtained.

created in the diagnostic wax-up and saving invaluable chairside time.

Several resin restorative systems and techniques are available to the dental practitioner to build imperceptible anterior esthetic restorations. The practitioner should match the material and technique to the anticipated restorative result and the patient's desires and expectations. The matrix technique is an excellent choice when several large multilayered restorations are desired. Inversely, small, single shade-opacity restorations can be readily accomplished without the use of a matrix.

### Conclusion

This case presented a highly predictable and repeatable technique for building up direct resin composite restorations. This technique can be used successfully with the available multiple shades and opacities. As composite resins are used for esthetic enhancement, the procedure represents a valuable framework on which to develop a rich stratification of natural tooth colors and shades, all built to a natural final appearance that achieves the expectations of both patient and professional.

### Acknowledgement

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### Conflicts

None declared.

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# Surface Treatments for Zirconia Bonding: A Clinical Perspective

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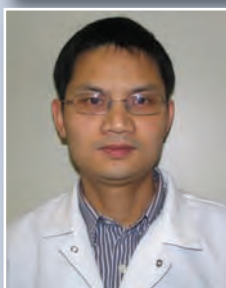
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**ABSTRACT**

There has been a monumental shift in the use of zirconia in esthetic/restorative dentistry. Zirconia-based restorative materials exhibit improved strength, versatility of clinical indications, and the ability to be CAD/CAM milled. They are also an alternative to the increasingly higher cost of precious metals. As well, the creation of surface adhesive primers that create covalent bonding to zirconia will only help to propagate zirconia's use in clinical dentistry.

**RÉSUMÉ**

Il y a eu un changement monumental dans l'utilisation de la zircone (oxyde de zirconium) en dentisterie esthétique ou de restauration. Les matériaux de restauration à base de zircone possèdent une résistance améliorée et une versatilité des indications cliniques et peuvent être utilisés avec la technologie CAO/FAO. Ce sont également une solution de rechange aux métaux précieux dont le prix ne cesse d'augmenter. De plus, la création de couches adhésives superficielles favorisant une fixation par liaison covalente à la zircone permettra de propager l'utilisation de la zircone en dentisterie clinique.

Zirconia ( $ZrO_2$ ) is a silica-free, acid-resistant, polycrystalline ceramic that does not contain amorphous silica ( $SiO_2$ ) glass. Traditional ceramic surface treatments (such as hydrofluoric acid [HF] etching and/or silane primer application) are ineffective on the silica-free surfaces of zirconia, alumina, and metal. New research has shown phosphate monomers to have a significant affinity for non-silica-based oxides such as zirconia. Research has shown that the combination of light air abrasion and methacryloyloxydecyl dihydrogen phosphate (MDP)-based zirconia primers is necessary to achieve long-term durable bonding to zirconia. It is imperative for the clinician to optimize adhesive performance in less-than-retentive preparation designs with the use of etch-and-rinse (total etch) or etch-and-dry (self-etch) adhesives onto dentin, such as All Bond 3 or All Bond SE (Bisco, Schaumburg, IL); MDP-containing primers onto the zirconia indirect substrate, such as Z-PRIME PLUS (Bisco); and dual-cure resin cements such as DuoLink or DuoLink SE (Bisco). When preparation designs are fully retentive (and strong adhesion is not critical), organophosphate-containing, self-adhesive,

dual-cured resin cements, such as BisCem (Bisco), Maxcem Elite (Kerr, Orange, CA), and RelyX Unicem (3M ESPE, St. Paul, MN), can be used.

The incorporation of proven monomers into new product innovation aimed at addressing clinical challenges is exciting. The use of primers to enhance bonding to zirconia has led to the development of improved material alternatives in metal-free esthetic restorative dentistry.

**Treating the Zirconia Surface: Low-Pressure  $Al_2O_3$  and Zirconia Primers**

The goal of replicating the cohesive hydrophobic interface (dentin-enamel junction, or DEJ) with the use of resin luting cements is first dependent upon the clinician addressing the individual needs of the tooth substrates (dentin, enamel) and the indirect substrates (zirconia, alumina, ceramic, metal). Adhesive bonding agents onto the tooth substrate and primers onto the indirect substrate are critical in optimizing this cohesion.

Zirconia has been used in clinical dentistry

for several years with much success.<sup>1-8</sup> Creating adhesion to non-silica-based oxide ceramics such as zirconia, alumina, and metal was the challenge that limited their use.<sup>9-14</sup> This is changing with our current understanding of zirconia. Zirconia is a silica-free, acid-resistant, polycrystalline ceramic. It does not contain amorphous silica glass (like feldspathic porcelain, leucite-reinforced ceramics, and lithium disilicate ceramics); thus, traditional ceramic surface treatments such as HF etching followed by silane application are ineffective.<sup>9-14</sup>

It is now understood that the combination of low-pressure  $Al_2O_3$  with primers specific to zirconia may contribute to long-term stability of its bonding. The use of pyro-chemical (Pyrosil, Sura Instruments, Jena, Germany)<sup>15,16</sup> or tribo-chemical treatments (Cojet/Rocatec, 3M ESPE)<sup>12,14,17-22</sup> to create a pseudo-silane attached surface is an alternative method. Internal research at Bisco Dental Products with tribo-chemical bonding (Cojet/Rocatec) showed that it did not offer improved bonding and could be prone to degradation. Other research has shown that tribo-chemical bonding improved bonding

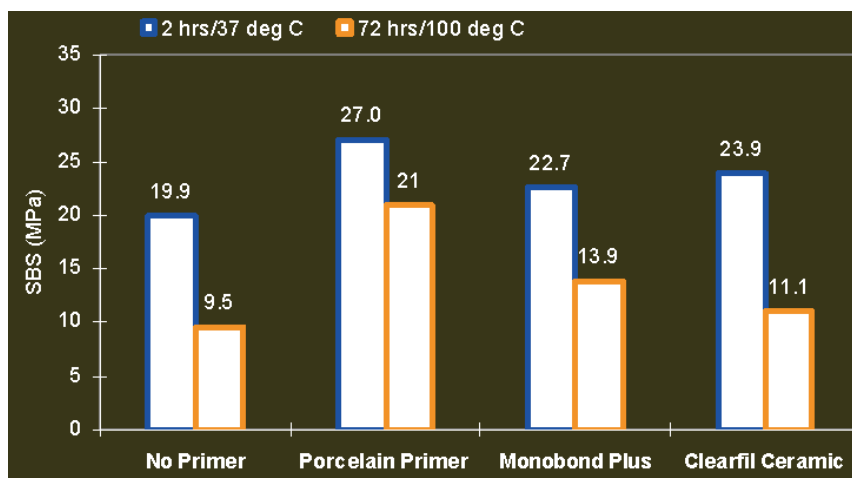


Figure 1. Shear bond strengths (SBSs) of different primers on etched lithium disilicates before and after accelerated aging (internal Bisco data).

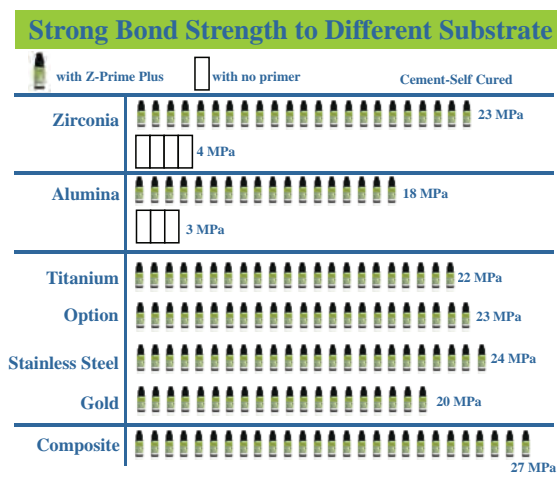


Figure 2. Bond strengths of Z-PRIME PLUS to various substrates.

with the use of primers.<sup>19</sup> Internal studies at Bisco have shown Z-PRIME PLUS adhesion does not require mechanical altering of the zirconia surface.

### Phosphate Monomers Specific to Zirconia

There are five commercial ceramic primer systems intended for use with zirconia: AZ Primer (Shofu Dental Corporation, San Marcos, CA), Clearfil Ceramic Primer (Kuraray America, Houston, TX), Metal/Zirconia Primer (Ivoclar Vivadent, Amherst, NY), Monobond Plus (Ivoclar Vivadent), and Z-PRIME PLUS. These products differ in the type and concentration of phosphate monomers used, clinical technique for use, time of application, and proprietary formulas. Phosphate monomers form chemical bonds with the zirconia surface and have resin terminal ends that bond to the resin cements. MDP is the most time-tested of the commonly used phosphate monomers and has been shown to have a special affinity for non-glass-based substrates of zirconia, alumina, and metal. MDP is a relatively hydrophobic monomer due to its 10-carbon chain and contains both a hydrophilic phosphate terminal end that chemically adheres to zirconia and a polymerizable methacrylate terminal end that adheres to resin.

Bond strengths are a function of the mode of curing, stability of the resin chemistry, compatibility of primer to cement, and contamination potential dependent upon clinical application times. The acidic nature of phosphate monomers does pose a chemical challenge with creating formulas that are both durable and stable. Monobond Plus and Clearfil Ceramic Primer incorporate silane with the intended additional use on silica-based surfaces. Silane is known to be unstable in acidic environments (Figure 1). The acidic nature of organophosphates (phosphate/phosphonate monomers) placed in products such as Monobond Plus and Clearfil Ceramic Primer may lead to instability of the silane component of these individual formulas. Z-PRIME PLUS does not contain silane.

Z-PRIME PLUS contains a propriety formula of concentrated MDP and carboxylic monomers formulated specific to zirconia, alumina, and metal. The versatility of these primers is a compelling feature for use on many different indirect substrates (Figure 2).

### Adherence of Resin Cements to Zirconia: The Science

Phosphate monomers in self-adhesive cements are proven to be effective in adhering to non-silica-based polycrystalline materials

of zirconia, alumina, and metal.<sup>17-20</sup> It is with this information that primers specific to zirconia, alumina, and metal were created. Numerous research studies have shown that phosphate /phosphonate monomers are very effective in improving zirconia bonding. In theory, phosphate monomers form chemical bonds with the zirconia, alumina, and metal oxide surfaces and have resin terminal end groups, which enable cohesive bonding to appropriate resin cements (Figure 3).<sup>22,23</sup>

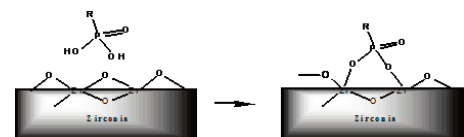


Figure 3. Demonstration of how the hydrogen (-H) group of a phosphate monomer interacts with the Zr-O group of zirconia to form a phosphate monolayer on the zirconia surface.

### Bonding Zirconia to Preparations with Retention/Resistance Form

Self-adhesive resin cements, such as BisCem, Maxcem Elite, and RelyX Unicem, are dual-cured, contain organophosphate monomers, and can be used when preparation designs are fully retentive; however, these cements are hydrophilic due to the acidic resin components and have lower physical and mechanical properties than resin cements. Self-adhesive resin cements differ in viscosity

# SURFACE TREATMENTS FOR ZIRCONIA BONDING: A CLINICAL PERSPECTIVE

Table 1. Shear bond strengths (MPa) of self-adhesive resin cements to zirconia

Zirconia Bonding Systems	Light-Cured Cement		Self-Cured Cement	
	Initial*: 37°C/2 h	Aging*: 100°C/3 d	Initial*: 37°C/2 h	Aging*: 100°C/3 d
BisCem	20.0 (3.6) 1, bc	12.1 (2.8) 2, b	12.4 (2.6) 1, b	9.6 (2.4) 2, b
RelyX Unicem	11.6 (6.2) 1, d	4.2 (2.9) 2, c	6.2 (2.6) 1, c	2.7 (2.0) 2, c
SmartCem2	16.2 (3.7) 1, cd	5.5 (1.9) 2, c	10.8 (3.0) 1, b	3.8 (1.8) 2, c
Z-PRIME PLUS/DuoLink	28.7 (5.7) 1, a	28.3 (4.4) 1, a	23.0 (5.3) 1, a	15.8 (2.7) 2, a

\*Means and standard deviations (n = 8) of shear bond strengths (MPa) tested on sandblasted zirconia using the Ultradent jig method. Results with the same numerical superscripts in the same row and same curing mode or same letter superscripts in the same column are statistically the same (p > .05) (internal Bisco data).

Table 2. Shear bond strength (MPa) of resin cements to zirconia

Zirconia Bonding Systems	Light-Cured Cement		Self-Cured Cement	
	Initial* 37°C/2 h	Aging* 100°C/3 d	Initial* 37°C/2 h	Aging* 100°C/3 d
AZ Primer/ResiCem	21.2 (8.3) 1, a	17.7 (5.5) 1, b	12.5 (5.9) 1, b	5.8 (1.9) 2, b
Clearfil Ceramic Primer/Panavia F2.0	7.5 (4.5) 1, b	3.2 (2.2) 2, c	8.9 (4.0) 1, b	1.7 (2.1) 2, c
Monobond Plus/Multilink Automix	26.4 (8.8) 1, a	15.5 (5.4) 2, b	10.8 (3.3) 1, b	6.7 (1.8) 2, b
Z-PRIME PLUS/DuoLink	28.7 (5.7) 1, a	28.3 (4.4) 1, a	23.0 (5.3) 1, a	15.8 (2.7) 2, a

\*Means and standard deviations (n = 8) of shear bond strengths (MPa) tested on sandblasted zirconia using the Ultradent jig method. Results with the same numerical superscripts in the same row and same curing mode or same letter superscripts in the same column are statistically the same (p > .05) (internal Bisco data).

(efficiency of mix) and self-cure chemistry (polymerization conversion, setting times). These properties are significantly affected with aging, depending upon the brand. Bond strengths of self-adhesive cements are lower than those of bonded resin cements to both dentin and zirconia; but in retentive preparations, the ease of placement is a compelling benefit (Table 1).

Self-adhesive resin cements may not be strong enough to be used alone on both surfaces (tooth and zirconia) when cementing a non-retentive zirconia restoration. Primers should be part of the clinician’s protocol to play a beneficial role for improved adhesion of self-

adhesive cements to zirconia. Glass ionomer cements have minimal bond strengths to zirconia (4 MPa) and are susceptible to water degradation due to their chemistry<sup>24-27</sup> (Figure 4).

### Creating Adhesion between Direct and Indirect Substrates When Retention Is a Challenge

For slightly retentive or non-retentive designs, traditional adhesive protocols are time tested and required. Optimizing adhesive performance is the goal in less-than-retentive preparation designs and demands the use of dentin adhesives including self-etch (ACE/All Bond SE, Bisco) or total etch (All Bond 3) primers specific to zirconia/metal (Z-PRIME PLUS) and the use of dual-cure hydrophobic resin cements (DuoLink).

Primers that address the specific needs of non-silica oxides (zirconia, alumina, and metal) are highly beneficial and warranted for the restorations when retention/resistance form is compromised. Ceramic and metal primers have been shown to be important to the success of bonding to these indirect materials in laboratory testing. Clinical experience with primers has indicated improved bonding to both direct and indirect substrates. The self-cure mode has been

shown to significantly affect bond strengths (Table 2).

### The Final Link: All Resin Cements Are Not Created Equal

Arguably, the most important factor in bonding to zirconia is the polymerization (setting) properties of resin cements. The self-cure modes of dual-cure cements are the link to optimizing adhesion between the tooth substrate and indirect restoration. To this date, most zirconia, alumina, and metal indirect restorations lack the ability to transmit the light required for proper polymerization of resin cements. The dual-cured mode is preferred over light-cured-only esthetic resin cements, removing the potential for limited light transmission through opaque copings.

It is important to note that all dual-cured cements are not created equal. Choose a dual-cured cement that performs equally well in both light-cured and self-cured modes, is not affected by aging (ask the manufacturer when the catalyst and base were made, not when they expire), and has an appropriate setting time. Resin cement that fully polymerizes in the self-cured mode within 6 minutes allows for interproximal flossing, whereas one that

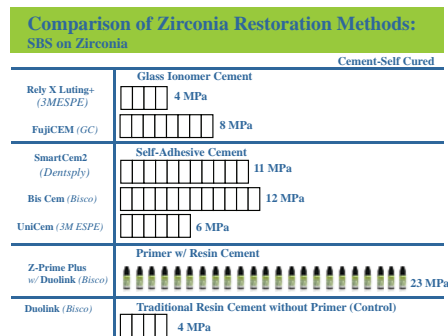


Figure 4. Comparison of shear bond strengths (SBSs) with various zirconia restoration methods.



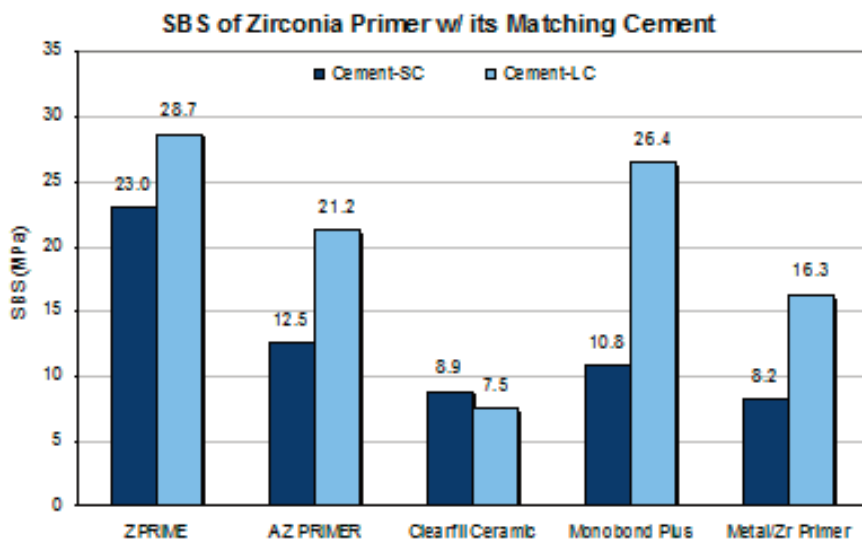


Figure 5. Comparison of shear bond strengths (SBSs) using corresponding brands (Z-PRIME PLUS/DuoLink, AZ Primer/ResiCem, Clearfil Ceramic Primer/Panavia F2.0, Monobond Plus/Multilink Automix, Metal Zr Primer/Multilink Automix) (internal Bisco data).

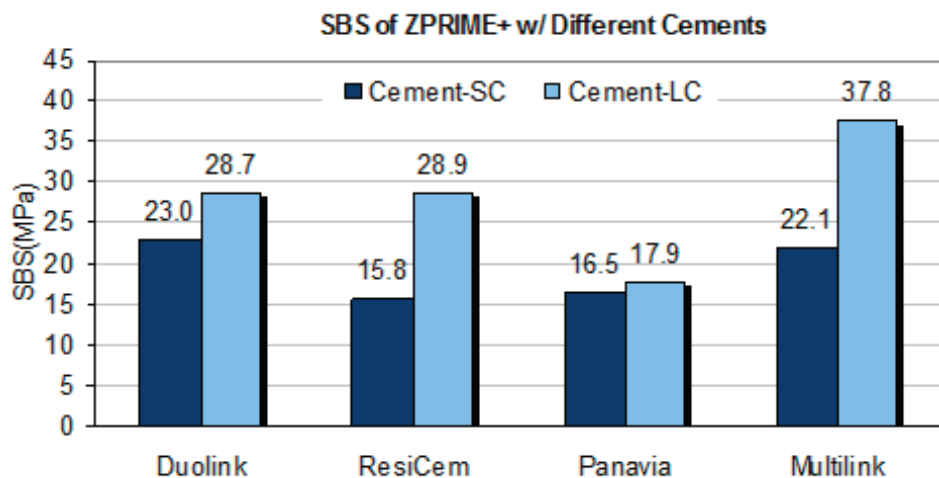


Figure 6. Shear bond strengths (SBSs) of Z-PRIME PLUS with various cements (internal Bisco data).

sets in 10 to 12 minutes requires appropriate measures not to interfere with the development of the bond. Internal testing at Bisco Dental Products supports previous data showing that self-cured modes of some resin cements significantly differ and many are further affected by aging of the chemistry (Figure 5).

Internal testing at Bisco has shown Z-PRIME PLUS to significantly improve the self-cure efficiencies of competitive brands of resin cements. It is theorized that the proprietary combination of monomers addresses acidity issues inherent within many formulas (Figure 6).

### Case Report Presentation

A 58-year-old female (a breast cancer survivor of 5+ years) presented to our practice. She had a retained deciduous tooth “h” with a mesio-angular impacted tooth #23 extending under teeth #21 through #24 (Figure 7) and was concerned about the darkening of this cuspid in addition to conservative enhancement of her smile (Figure 8). A comprehensive list of treatment options was discussed, including orthodontic repositioning. The accepted plan was for the extraction of tooth h, a zirconia framework/porcelain bridge to replace #23, a composite to correct the facial incisal of #21, and a composite on #13 to restore the cusp tip and to provide cuspid disclusion in excursive movements.

### Preparation and Design

The laboratory prescription was for a zirconia framework bridge with add-on porcelain over an ovate pontic design (Figures 9 to 12). Zirconia has been widely used the past few years as a bridge framework because of its non-metallic colour, fracture resistance with flexural tests over 1,000 MPa, and excellent long-term clinical success. A major disadvantage of its use was the inability to



Figure 7. Lateral view of greying deciduous cuspid.



Figure 8. Maxillary anterior pre-treatment display.



Figure 9. Pep Gen granular and flow graft materials were placed and a collagen membrane sutured in place for stabilization.



Figure 10. Conservative preparation designs with minimal reduction, rounded shoulders, and seating grooves parallel in nature.



Figure 11. Zirconia framework overlaid with Ceram porcelain.



Figure 12. Our reputation is built on adhesion.



Figure 13. Ten-second application of Z-PRIME PLUS, which would be followed by air-drying.



Figure 14. Maxillary anterior view of restoration.

bond zirconia to the tooth substrate. Our improved knowledge of non-glass-based oxides such as zirconia has resulted in the subsequent innovation of adhesives with special qualities. Z-PRIME PLUS is one of those special primers that have been shown to significantly increase bond strengths to zirconia allowing for more conservative removal of tooth tissue.

### Treatment Completion

Following verification of the fit, the bridge was cleaned in an ethyl alcohol ultrasonic bath for 10 minutes. Two drops of zirconia primer (Z-PRIME) were placed on the internal surface of the porcelain abutments and dried after 10 seconds (Figure 13). It was my decision to optimize adhesion with the use of total etch on dentin/enamel, coupled with the use of a hydrophobic dual-cure resin cement.

The abutments were cleaned with slurry of pumice/water. The etch-and-rinse technique was accomplished using phosphoric acid (UNI-ETCH BAC, Bisco) followed by disinfecting/rewetting with a cavity cleanser CHX and an application of All Bond 3 primer/resin. DuoLink dual-cure resin

cement was placed directly on the teeth, and the bridge was positioned with moderate digital pressure. Clean-up was initially accomplished using a microbrush and 2 × 2 cotton gauze. Margins were initially light-cured; then the dual cure was allowed to cement to complete polymerization in self-cure mode. Final clean-up was accomplished using 204S scaler and explorer. Occlusion was checked, cuspid disclusion verified, and anterior guidance was checked.

Teeth #13 and #21 were prepared lightly using a finishing diamond to remove old filling material, to make an irregular finish line, and to remove staining. The teeth were isolated with retractors (SeeMore, Discus Dental, Culver City, CA) and etched for 20 seconds with 37% phosphoric acid (UNI-ETCH BAC); subsequently, they were rinsed, and several coats of bonding agent (All Bond 3) were applied. Various layers of dentin, enamel, and incisal opacities of composite (Renamel, Cosmedent, Chicago, IL) were applied with Creative Color (Cosmedent) stain.

The lingual and bulk of the tip on #13 were completed using Renamel Universal



Figure 15. A smile to be proud of.

Microhybrid for strength, tinted with grey and honey yellow Creative Color and covered facially with Renamel Microfil Incisal Medium for polishability. Occlusion was checked and cuspid disclusion on #6 was confirmed. Polishing was completed with FlexiDisk rubber polishers (Cosmedent). Tooth #21 was restored using Renamel Microfil Incisal Medium, coupled with matching tints. Shaping was completed with SofLex disks (3M) and polishing with FlexiDisk (Cosmedent) rubber polishers.

A clear, vacuum-formed, 2 mm hard/soft nocturnal bruxism splint was made (Erkodent, Glidewell Labs, Newport Beach, CA), and the patient was encouraged to wear

it nightly to prevent parafunctional forces particularly under times of stress.

The final result was pleasing (Figures 14 and 15).

### Conclusion

Patients demand esthetics. The incorporation of zirconia in clinical dentistry offers a new alternative to metal-free esthetic dentistry. New esthetic restorative materials demand adhesion. Recreating the DEJ is a function of addressing the needs of the individual substrates involved (enamel, dentin, and indirect materials such as zirconia). The use of adhesives on the tooth substrate and the use of primers on the indirect substrate in conjunction with quality resin-based cements are crucial in optimizing clinical outcomes to these new restorative materials.

### Disclosure

Dr. Byoung Suh is the founder of Bisco Dental. Dr. Liang Chen is a senior researcher at Bisco Dental. Dr. Douglas Brown is senior manager of clinical affairs at Bisco Dental. Dr. Jack Griffin Jr. declares he has no financial interest in the materials mentioned in this article and is not receiving an honorarium for his contribution to this article. The content provided is based solely on his belief in translating science to the application of clinical dentistry.

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# Immediate Placement and Provisionalization of an Implant in the Esthetic Zone Utilizing the Patient's Own Tooth

Robert C. Margeas, DDS

## ABSTRACT

The maintenance and development of an esthetic hard and soft tissue complex are a prerequisite in implant therapy, particularly when treatment occurs in the esthetic zone. Recession following tooth removal in the anterior maxilla presents a unique restorative challenge; the most effective way of maintaining the papilla and soft tissue height is to prevent their loss at the time of extraction. This article presents a technique to minimize the duration of treatment time and to preserve the hard and soft tissue contours. The procedure, presented in a case report, also eliminates the necessity of a removable provisional prosthesis by immediate placement and provisionalization of a single-stage implant in the anterior maxilla utilizing the patient's own extracted tooth.

## RÉSUMÉ

Le maintien et le développement d'un complexe esthétique de tissus durs et mous sont une condition préalable de la pose d'implants, en particulier lorsque le traitement est fait dans la zone esthétique. La récession suite à une extraction dans le maxillaire inférieur représente un enjeu unique de restauration. La façon la plus efficace de maintenir la papille dentaire et la hauteur du tissu mou est d'empêcher leur perte au moment de l'extraction. Cet article présente une technique pour réduire la durée du traitement et pour conserver les contours des tissus durs et mous. La procédure, présentée dans un rapport de cas, élimine aussi le besoin d'avoir une prothèse amovible provisoire en faisant une extraction-implantation simultanée avec mise en charge en utilisant la dent extraite du patient.



## About the Author

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The maintenance and development of an esthetic hard and soft tissue complex are a prerequisite in implant therapy, particularly when treatment occurs in the esthetic zone.<sup>1</sup> An implant that is osseointegrated does not always translate into esthetic success.<sup>2</sup>

Recession following tooth removal in the anterior maxilla presents a unique restorative challenge for the practicing clinician. The objective following removal is to maintain the hard and soft tissue architecture. The most difficult area is the papilla. We must do everything possible to maintain the volume of tissue and prevent shrinkage.

The most effective way of maintaining the papilla and soft tissue height is to prevent their loss at the time of extraction. The gingival architecture must be maintained and supported immediately following extractions. This requires precise surgical technique without removing interproximal or facial bone. The extraction must be as atraumatic to the tissue as possible. Surgical flaps and incising of the papilla should not occur in the ideal situation.

Critical to the preservation of tissue height is to control the gingival embrasure at the time of extraction. If the embrasure space is not filled with a provisional with the same volume as the previously existing tooth, the papilla and surrounding tissue will lack support, causing the gingival scallop to flatten out and the interproximal papilla to recede.<sup>3</sup> Prior to extraction of the tooth, the gingival form and bony architecture must be evaluated. If the existing tissue and bone are acceptable, then the objective is to preserve as much of the original form as possible. If there is facial bone loss, a degree of recession can be expected. The bone is needed to maintain and support the overlying tissue. Additional

treatment may be necessary at the time of extraction, which may include bone grafting.<sup>4</sup> The predictability of treatment is also influenced by the thickness of the periodontium, as thicker tissues have a reduced tendency to recede.

This article presents a technique to minimize the duration of treatment time and to preserve the hard and soft tissue contours. This procedure also eliminates the necessity of a removable provisional prosthesis by immediate placement and provisionalization of a single-stage implant in the anterior maxilla utilizing the patient's own extracted tooth. While a removable partial denture can also be utilized as a provisional restoration, there is greater risk of affecting tissue changes due to the movement of the prosthesis.

### Case Presentation

A 50-year-old male patient presented with a right lateral incisor that was fractured in an accident (Figure 1). The patient was given several treatment options, including a fixed partial denture, removable appliance, or a fixed implant restoration. The patient opted for fixed implant restoration.

Examination, both clinically and radiographically revealed no periapical radiolucency or signs of active infection. Probing depths were within normal limits. The patient was informed possible modifications to the tissue may be necessary if there were significant gingival changes following surgery.

### Surgical Procedure

Local anesthetic was administered, and periostomes were used to loosen the periodontal ligament. The tooth was atraumatically removed without reflecting a flap. The implant was then placed using a

surgical guide fabricated on a drill press and surveyor as described by Higginbottom.

A Nobel Replace Select (Nobel Biocare, Zurich, Switzerland) was used, and stability was achieved by engaging bone beyond the extraction socket. A minimum distance of 1.5 mm was maintained between the implant and adjacent teeth to minimize marginal bone loss due to the encroachment of the lateral biologic width.<sup>5-7</sup>

### Abutment Placement

An immediate temporary abutment and plastic pick-up were placed and hand tightened (Figure 2). No preparation was necessary as this is a stock component and the occlusion did not interfere.

### Provisionalization

The patient's extracted tooth would serve as the provisional restoration while healing occurred. The root was sectioned horizontally with a Brasseler diamond bur (Brasseler USA, Savannah, GA) 3 mm from the cemento-enamel junction (Figure 3). The tooth was hollowed out in order to fit over the abutment (Figure 4). This was tried in the mouth to make sure the tooth would fit accurately. After confirming an accurate fit, the tooth was etched for 30 seconds. A bonding agent was applied and light cured 20 seconds. A methyl methacrylate material such as Snap or Duralay was mixed and applied to the inner surface of the tooth (Figure 5). The tooth was then placed on the abutment and allowed to fully polymerize (Figure 6). The tooth was removed, and the margins required relining (Figure 7). The tooth was placed on an analog extraorally so accurate margination could be achieved (Figure 8). In order to achieve a bond to the plastic abutment, the area was sandblasted with aluminum oxide particles (Figure 9). A bonding agent was



Figure 1. Right lateral incisor fractured in an accident



Figure 2. An immediate temporary abutment and plastic pick-up were placed.

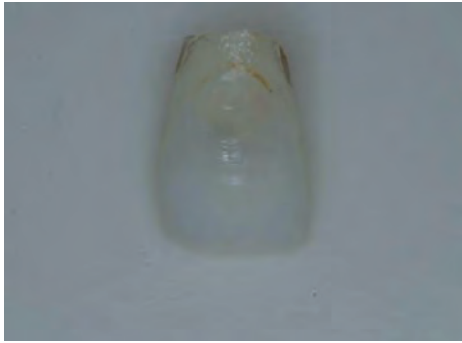


Figure 3. After horizontal sectioning of the root.



Figure 4. The tooth was hollowed out.



Figure 5. Application of methyl methacrylate material to the inner surface of the tooth.

applied to the surface and light cured (Figure 10). Flowable resin was placed around the margins and polymerized (Figure 11). Figure 12 shows the tooth after relining but before finishing. The emergence profile is flattened and the margins trimmed to fit the abutment accurately (Figure 13).

The internal aspect of the crown is shown in Figure 14. A thin layer of Zone temporary cement (DUX Dental, Oxnard, CA) was applied to the inner surface, and the tooth was placed on the abutment (Figure 15). Care

was taken to minimize overfilling the restoration. Excess cement was easily removed after its initial set.

The tooth was taken out of occlusion and there were no contacts in centric or excursive movements. The patient was advised against functioning on the surgical site and care was to be taken when performing oral hygiene. After eight weeks of healing, the patient returned for a tissue check. The free gingival margin maintained itself without further recession (Figure 16).

### Conclusion

Immediate implant placement has been advocated since 1989 to preserve the height and width of the alveolar bone.<sup>8</sup> Several steps must be followed in order to achieve esthetic results on a consistent basis. The tooth must be atraumatically removed, and preservation of the labial bony plate is vital to the success of the technique.

Patients with thick and flat gingival architecture are better candidates for this treatment. Thin and highly scalloped gingiva



Figure 6. Placement of the tooth on the abutment.



Figure 7. The margins required relining.



Figure 8. Placement of the tooth on an analog to achieve accurate margination.



Figure 9. The area was sandblasted with aluminum oxide particles.



Figure 10. A bonding agent was applied to the surface.



Figure 11. Flowable resin was placed around the margins.





Figure 12. The tooth after relining but before finishing.



Figure 13. The margins were trimmed to fit the abutment.



Figure 14. Internal aspect of the crown.



Figure 15. The tooth was placed on the abutment.



Figure 16. There was no further recession on the free gingival margin.

has more of a tendency to recede. While flapless surgery may minimize bone loss, its lack of visibility may present limitations that require careful evaluation and meticulous surgical execution.

#### Disclosure

No conflicts declared.

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# Interdental Papilla Reconstruction: Classification and Clinical Management

Harinder S. Sandhu, DDS, PhD, and W. Peter Nordland, DDS

## ABSTRACT

Loss of interdental papillae in the maxillary anterior area is a significant esthetic problem. Missing papillae, due to malalignment of teeth, tooth shape or size, or location of the contact point, can at least partially be rectified by orthodontic and restorative procedures. The surgical reconstruction of interdental papillae has not been predictable. This paper reviews the classification of papillae loss and factors affecting the successful surgical reconstruction of interdental papillae. A multidisciplinary approach is recommended in many cases.

## RÉSUMÉ

La perte de papilles inter-dentaires au niveau du maxillaire antérieur est un problème esthétique majeur. L'absence de papilles, en raison de dents mal alignées, de dents difformes ou de l'emplacement du point de contact, peut au moins être corrigée partiellement par traitement orthodontique ou de restauration. La reconstruction chirurgicale des papilles inter-dentaires est imprévisible. Cet article passe en revue la classification de la perte de papilles et des facteurs affectant la reconstruction chirurgicale réussie des papilles inter-dentaires. Une approche multidisciplinaire est recommandée dans plusieurs cas.



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Maxillary anterior esthetics is dependent upon the teeth and their framing by the lips and the gingival architecture.<sup>1,2</sup> New restorative materials and refined periodontal surgical techniques have improved the success and predictability of esthetic enhancement procedures.<sup>3</sup> Loss of the interdental papilla caused by trauma or periodontitis remains a significant esthetic challenge to dentistry. Tremendous progress has been attained in esthetic reconstruction of soft and hard tissues around implants.<sup>4-9</sup> Many clinicians have tried over the years to reconstruct lost interdental papillae around natural teeth; however, a high level of success and predictability has not been achieved.<sup>10-16</sup>

The classification system for loss of papillary height<sup>17</sup> has allowed clinicians to at least diagnose and communicate the potential for success to patients. This paper will discuss the classifications and the factors related to success and predictability of procedures for reconstruction of papillae. A step-by-step description of microsurgical reconstruction of interdental papilla is published elsewhere.<sup>18</sup>

### Papilla Reconstruction – Multidisciplinary Management and Clinical Decision Making

Clinical management of the deficient papilla can involve surgical tissue addition, orthodontic root approximation, and/or alteration of tooth shape by restorative procedures.

The management of the embrasure space or “missing papilla” due to malalignment of teeth or orthodontic movement of teeth is

discussed in an excellent paper by Kurth and Kokich.<sup>19</sup> A brief description and diagrammatic representation of various orthodontic and restorative treatments are presented here.

Long cylindrical teeth have a narrow cervical area and contact point located near the incisal edge.<sup>20</sup> To increase the chance for papilla formation, it may be advisable to move the contact point apically with restorative procedures. The adjustment of the mesio-distal width of teeth can also be accomplished restoratively, creating a wider crown with the addition of restorative material. This will allow some degree of closure of the embrasure space.<sup>21,22</sup> Missing papillae caused by splaying of teeth due to loss of periodontal support have been successfully treated by a combination of periodontal surgery followed by immediate orthodontic intervention.<sup>23</sup>

In adulthood, during orthodontic treatment in which overlapping of teeth is corrected, an interdental papillary space may open and also need to be fixed. Stripping of crowns and orthodontic root alignment can help to close the embrasure space. Similarly, with extrusion of teeth, the mesio-distal dimensions narrow and may have to be corrected by restorative procedures. Some important variables which may influence the presence of the papilla include: interproximal contact position, root angulation, crown form and embrasure areas<sup>19</sup> (Figure 1).

A thorough periodontal assessment of the proposed treatment area should be

accomplished. Periodontal inflammation should be eliminated with thorough debridement, root planning, and adjunctive measures. The surgical site should also be free from any periapical pathology.

### Factors Influencing Surgical Reconstruction of the Papilla

If the loss of the interdental papilla is not a result of tooth position, root angulation or tooth shape, then the surgical reconstruction of the papilla could be considered. Generally, if a papillary defect was caused by a surgical insult, then surgical addition of tissue can be the best choice of treatment modalities.

### Extent of Tissue Loss

To facilitate the discussion of management of papillae loss, the Nordland and Tarnow<sup>17</sup> classification is presented here.

The Nordland and Tarnow classification utilizes three anatomical landmarks: the interdental contact point, the facial apical extent of the cemento-enamel junction (CEJ) and the coronal extent of the interproximal cemento-enamel junction (Figure 2.)

### Normal

Interdental papillae fill embrasure space to the apical extent of the interdental contact point/area.

### Class I

The tip of interdental papillae lies between the interdental contact point and the most coronal extent of the interproximal cemento-enamel junction (CEJ) (space present but interproximal CEJ is not visible; Figure 3).

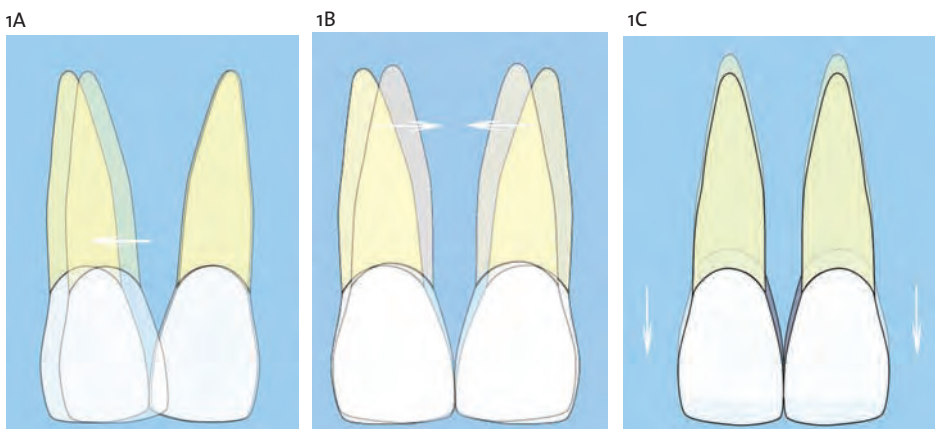


Figure 1. A, Overlap of maxillary central incisors with divergent roots and orthodontic movement to correct the overlap without addressing root alignment resulting in increase in embrasure space. B, Orthodontic correction of crown overlap and resultant increase in interdental space. With correction of root angulation (white arrows), the embrasure space can be partially closed. C, Orthodontic extrusion causing an increase in the interdental space. The shaded area on the mesial of incisors represents restorative addition to close the space by widening the crowns.

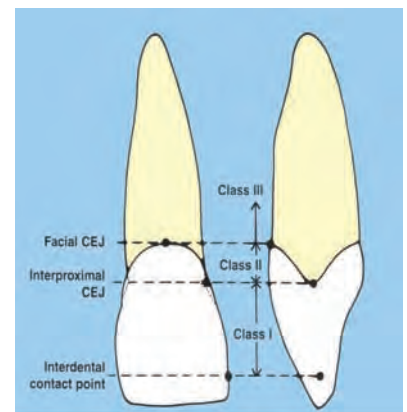


Figure 2. Anatomical landmarks used in the classification system for loss of papillary height (adapted from Nordland & Tarnow).<sup>16</sup>



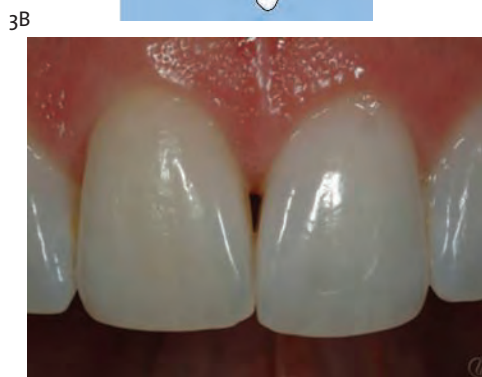
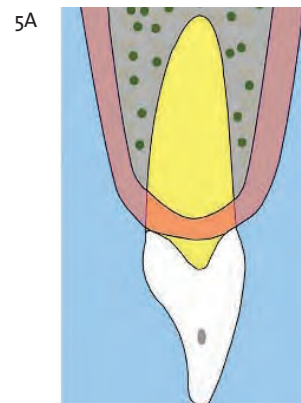
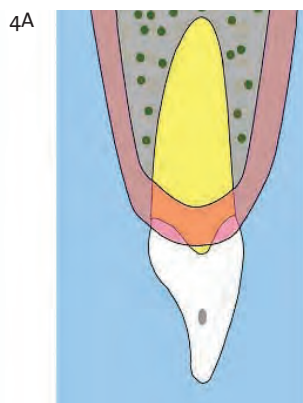
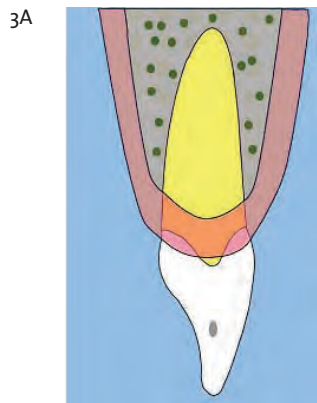


Figure 3. A, Interproximal view in class I papilla loss. B, Class I - Papilla has receded from the contact point; however, interproximal and facial CEJ are not visible.

Figure 4. A, Interproximal view in class II papilla loss. B, Class II - Papilla is receded from the contact point and interproximal CEJ is partially visible.

Figure 5. A, Interproximal view in class III papilla loss. B, Class III - Papilla is receded and both interproximal and facial CEJ are visible.

**Class II**

The tip of interdental papillae lies at or apical to the interproximal CEJ but, coronal to the apical extent of the facial CEJ (interproximal CEJ visible) (Figure 4).

**Class III**

The tip of the interdental papillae lies level with or apical to the facial CEJ (Figure 5). For further precise communication, Nordland and Tarnow<sup>17</sup> have sub-classified the papilla loss by including measurement of papilla loss in mm from the above-mentioned reference points.

**Anterior Papilla Anatomy and Tissue Biotype**

It had been described, that in the maxillary anterior region, the labial and lingual component of the interdental papilla are joined with a central depression around the contact point creating what is termed a “col.” Because of the small size and blood supply

pattern the interproximal papilla is, in effect, an end artery organ.<sup>24</sup> In fact, it has been shown recently that in the anterior maxillary region the papillae are of pyramidal shape, rather than “col” shaped.<sup>14</sup> Thus the volume of an intact papilla can be determined by calculating the volume of a pyramid (Volume = Length × Height × Width / 3). Furthermore, a thin gingival unit (Thin Bio Type) would present a greater challenge. Obviously, the outcome of papilla reconstruction will be better in cases with a thick gingival unit (Thick Bio Type). Due to small dimensions of the area being reconstructed, microscopic magnification and use of microsurgical instruments can be of significant value. Ideally, existing vascular supply can be protected by avoiding releasing incisions.

**Availability of Donor Tissue**

The extent of tissue loss should be assessed and a careful determination should be made

of the availability of donor tissue. The surgeon must determine the size and quality of donor tissue needed to restore the lost papillary volume. Sometimes if the necessary volume is small, then palatal dense fibrous connective tissue can be used as the donor source. If a larger volume is required, then the presence of thick fibrous tissue in the tuberosity area can make it an ideal site for harvesting donor tissue for papillary reconstruction. Occasionally the patient may not have the desired tissue volume available in the tuberosity area and alternative sites must be explored or sequential surgical procedures may be necessary. Recently, it has been shown that thicker palatal tissue can be created by inserting sterile lyophilized bovine collagen between bone and full-thickness flap at a prospective donor site. Following eight weeks of healing a substantially thicker donor tissue can be obtained.<sup>25</sup>

Because the interdental papilla has a

pyramidal shape, its volume can be determined using the equation: pyramid volume = Length × Height × Width / 3. Accordingly, large loss of tissue volume accompanies the loss of papillary height. For example with 1 mm loss of papillary height, the volume loss equals 0.33 cubic millimeters. However the volume loss escalates rapidly and as the papillary height loss increases to 5 mm, the volume of the lost tissue equals 41.6 cubic millimeters.

#### Distance between the Interproximal Alveolar Bone to Contact Point

Much confusion exists over the influence of the underlying alveolar bone on the presence or absence of the interdental papilla. Tarnow et al.<sup>26</sup> showed that the presence of the interdental papilla decreases as the distance from the contact point to alveolar bone increases. This paper also showed that the interdental papilla is almost always present when the distance is 5 mm or less. Even at a distance of 9 mm, the papilla can still be present but with less frequency (25%). This suggests that the presence of interdental alveolar bone is desirable, but not essential for papilla reconstruction.

#### Surgical Management of Missing Papilla

Seibert's onlay graft technique was originally targeted towards the correction of ridge deformities by transplanting a thick epithelized graft from the palate.<sup>27,28</sup> Ovate pontics were used to modulate the healing of tissue to form a papilla between edentulous areas and natural teeth.

The details of this surgical technique and the coordination of surgical and prosthetic procedures are discussed by Seibert.<sup>28</sup> This method of ridge augmentation and papilla formation is very technique sensitive and leaves a large palatal wound at the donor site, and the colour match at the recipient site may not be ideal. However, in cases where large ridge augmentation along with papillae reconstruction are required, this technique may be considered appropriate.

Many clinicians have proposed surgical techniques for reconstruction/preservation of interdental papilla with varying degree of success.<sup>10-16, 29-39</sup> All these techniques rely on a releasing incision in the surgical area. The success of microsurgical techniques are

dependent on preservation of blood supply and minimal tension on wound closures.<sup>30</sup> Nordland and Sandhu<sup>39</sup> have proposed a microsurgical technique, which is a combination of the tunnel technique<sup>18</sup> and the coronally positioned flap<sup>39</sup> with significant modifications. Since microsurgical instruments are used under magnified fields, no releasing incisions are made. This protects the blood supply to the grafted tissue from the overlying flap. Contact points are closed with resin bonding and suspensory sutures are used to stop the relapse of tissue to its original position. The step-by-step details of this technique are discussed in a separate paper.<sup>39</sup>

#### Conclusion

This case demonstrates a patient who was referred for closure of embrasive between lateral and central incisors. In addition to the class I papilla loss, there is bilateral ridge deficiency present. Patient was treated with microsurgical closure of embrasive space and ridge augmentation (Figure 6).

#### Disclosure

No conflicts declared.



Figure 6. A and B, A clinical picture of class I loss of papilla (between lateral and central incisors) selected for surgical and restorative correction. C and D, Surgical view showing a connective tissue graft sutured under the flap, and the flaps coronally positioned and held with suspensory sutures. E and F, Six months post operative views following minor restorative correction and showing complete closure of embrasive spaces.

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# Enhancing Smile Using Porcelain Laminates after Gingival Recontouring: A Clinical Case Report

By Sandeep Walia, DDS; Marcela Ibarra, DDS; Gildo Coelho Santos Jr, DDS, PhD; Harinder Sandhu, DDS, PhD, Cert. in Perio, FACD, FICD

## ABSTRACT

Ceramics have been used in dentistry and medicine for many years. Currently ceramic restorative materials possess colour stability, mechanical strength, clinical longevity, excellent esthetic appearance, optimal bond strength to tooth substrate, and are compatible with the periodontal tissues. Their properties make these materials suitable for a wide range of clinical applications. The porcelain veneers are considered an excellent esthetic restorative option for darkened teeth and provide a conservative method of improving appearance or contour with high degree of patient acceptance. The present case report illustrates the results that can be achieved using porcelain laminate veneers to restore anterior dentition with a highly darkened tooth and misaligned teeth, presenting diagnostic casts, conservative preparations, provisional restorations, impressions, and adhesive cementation.

## RÉSUMÉ

Les céramiques ont été utilisées en dentisterie et en médecine depuis plusieurs années. Les matériaux pour les restaurations en céramique possèdent la stabilité de la couleur, une force mécanique, une longévité clinique, une excellente apparence esthétique, une résistance d'adhésion au support de la dent, et sont compatible avec les tissus périodontiques. Leurs propriétés rendent ces matériaux utiles pour une vaste gamme d'applications cliniques. Les restaurations en porcelaine sont considérées comme une excellente option pour des dents décolorées et fournissent une méthode conservatrice d'améliorer l'apparence ou le contour des dents. Le présent rapport de cas illustre les résultats que l'on peut obtenir à l'utilisation de facettes en porcelaine pour restaurer une dent très décolorée et mal alignée, présentant un modèle d'étude, des préparations conservatrices, des restaurations provisoires, des empreintes et le cimentage.



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Porcelain veneers have become the standard of care for esthetic smile rehabilitation. Important factors in the selection of porcelain veneers as a choice of treatment are the properties such as colour stability, mechanical strength, longevity, excellent esthetic appearance, optimal bond strength to tooth substrate, and compatibility with the periodontal tissues.<sup>1</sup> Further, it allows the conservation of tooth structure.

Porcelain veneers have traditionally been made from aluminous or reinforced feldspathic porcelains.<sup>2</sup> Fired feldspathic porcelains (such as IPS d.Sign [Ivoclar Vivadent, Schaan, Lichtenstein], Lumineers by Cerinate [Den-Mat, Santa Maria, CA.], or Omega 900 [Vita Zahnfabrik, Bad Sackingen, Germany]) can be created as thin as 0.3 mm. Pressed feldspathic porcelains (such as IPS Empress [Ivoclar Vivadent], and OPC [Jeneric Pentron Clinical Technologies, Wallingford, CT]) can be created as thin as 0.5 to 0.7 mm. Depending on the existing conditions such as severe discolouration, protruding teeth, or crowding and the desired result, clinicians have advocated a range of preparation techniques for porcelain veneers: no preparation, enamel-only preparation, varied levels of dentin preparation and interproximal extensions.<sup>3-7</sup>

Conventional feldspathic ceramics can be chosen as well when the tooth is not exposed to functional occlusal loading and presents severe colour alteration, which could be effectively masked by the laminate veneer. The use of a feldspathic porcelain and refractory die technique allow different layers of porcelain to be added to achieve lifelike shade and translucency. In addition, the predominant vitreous phase (46–66%) in this type of ceramic determines its excellent esthetic characteristics.<sup>7</sup>

In planning for achieving the desired result, the dentist should analyze the specific condition of each patient using a diagnostic wax-up taking in consideration the amount of reduction needed in order to choose the type of porcelain. The design of veneer preparations is case specific if it is to satisfy the final esthetic goals; the design cannot be generalized as a single protocol to use in every situation.<sup>8-10</sup>

The dentist should understand the patient's esthetic objectives and concerns before undertaking any procedure, and the patients should understand the limitations of the treatment, especially when limiting options, for example, declining orthodontic treatment or tissue-recontouring procedures, or by not allowing reduction of a rotated tooth. The consensus on the treatment plan can be achieved by means of a mock-up technique with direct composite resin which will facilitate the visual communication and understanding of the possible final result.

**Clinical Case**

A 45-year-old female came to Schulich School of Medicine and Dentistry's adult clinic at the University of Western Ontario, and requested esthetic dental treatment because her maxillary anterior teeth were misaligned and central incisor discoloured. A full examination, including examination of soft tissue, periodontal and dental examination, radiographs and photographs of the anterior teeth (Figure 1), was performed.

During clinical evaluation it was observed that she presented a class I skeletal profile with 50% overbite, 2 mm over-jet, and that teeth 13, 21, and 23 were discoloured. Tooth 12 was proclined and presented with a caries lesion at the labial surface. The patient had no parafunctional habits such as clenching or bruxism. The periodontal tissue was thick and pink but irregularly scalloped in the maxillary anterior area; depth of probing varied from 2 mm from the distal of tooth #13 to 1 mm at the distal of tooth #23. There was discrepancy in the height of clinical crowns between right and left maxillary anterior segments.

The information gathered, combined with a complete diagnostic wax-up of the proposed restorations, allowed a thorough diagnosis and comprehensive treatment plan to be presented and was discussed with the patient. A porcelain laminate veneer preceded by gingivoplasty was the treatment of choice to correct position, length, and colour mismatch of the anterior dentition. Gingivoplasty was selected instead of regular crown lengthening based on the existence of the sufficient thickness of the attached gingiva and the restoration margins were prepared at the gingival crest. No further surgical intervention was deemed critical.

Electro surgery was performed (Ellman Automatic Dento-Surg 90 FFP, Ellman International INC, Hewlett, NY, USA) on



Figure 1. Frontal view.



Figure 2. Pre-operative view with red marks around the gingival margin determining the amount of tissue reduction.



Figure 3. Gingivectomy completed with electrocautery to correct tissue heights.



Figure 4. Gingival aspect after the 60-day healing period.



Figure 5. Frontal view showing tooth preparation for porcelain veneers.

teeth 13, 12, and 11 to mimic the gingival heights with teeth 21, 22, and 23 (Figures 2 and 3). The patient was reassessed after a 60-day healing period presenting an esthetic “gum line” (Figure 4).

After discussing the treatment plan again with the patient, the informed consent was obtained to perform the tooth reduction for six porcelain veneers. The teeth were reduced approximately 0.5 mm of the labial surface using fine diamond burs with the aid of a putty matrix obtained from the diagnostic wax-up and with a finishing chamfer margin just below the gingival margin (Figure 5). The incisal edge of each tooth was reduced 1.5 mm in order to have an incisal overlap, which would allow proper seating of the veneers. Tooth 21 was reduced 0.7 mm in order to increase the thickness of the porcelain to block the discoloration.

Before the final impression, a knitted gingival retraction cord (# 00 Ultrapack, Ultradent Dental Products, South Jordan, UT) impregnated with hemostatic solution (Hemodent, Premier Dental Products Co, Plymouth Meeting, PA) was packed inside the gingival sulcus and left in place for six minutes in order to ensure that a secular space was kept for the impression material. The final impression of the prepared teeth was made with polyvinylsiloxane impression material (Take 1 heavy and light body, Kerr, Orange, CA) on a stock tray. After the cord was removed, a low viscosity material (light body) was injected onto the prepared tooth and a high viscosity material (heavy body) was injected onto the tray, which was immediately carried to the patient’s mouth (Figure 6). An impression of the opposing arch and the occlusal registration was taken and the casts were mounted on a semi-

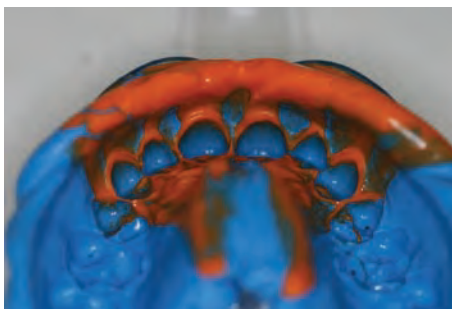


Figure 6. Final impression with PVS material. Note proper tissue retraction.

adjustable articulator with replication of the incisal guidance obtained with the diagnostic wax-up.

After the final impression was taken, the surfaces of the prepared tooth were isolated with a glycerin gel and a temporary restoration was fabricated with a flowable composite resin (Revolution Formula 2, shade A2, Kerr, Orange, CA) to protect dental tissues and re-establish tooth shape. Only a very small spot in the center of the preparation was etched and had adhesive (Scotchbond Multipurpose, 3M ESPE, St Paul, MN) applied to it for the composite resin to adhere. This procedure ensured easy removal of the provisional restoration at the next visit without damaging the margins of the provisional veneer. The patient was satisfied with the change in appearance (Figure 7).

As close communication with the dental laboratory technician is essential, impressions and photographs were sent to the laboratory along with the information regarding shade selection (1M2 [VITAPAN 3D Master, VITA Zahnfabrik, Spitalgasse, Bad Säckingen Germany]). The veneer was fabricated with a feldspathic porcelain material (EX-3, Noritake Co., Tokyo, Japan) based on a refractory dye system, following the manufacturer’s recommendations.

When the laminates returned from the lab, a careful check was completed of the proximal contacts, shade match, contour, and marginal adaptation. Each ceramic veneer was etched for two minutes with 10% hydrofluoric acid (Vita Ceramic Etch, VITA Zahnfabrik, Spitalgasse, Bad Säckingen Germany), washed with water and dried. A silane agent (Monobond S, Ivoclar Vivadent AG, Schaan,



Figure 7. Provisional restorations reproduced from the diagnostic wax-up.



Figure 8. Final results, frontal view.



Figure 9. Forty-eight hours post insertion check-up. Lateral view showing the proper teeth alignment and an esthetic smile restored.

Liechtenstein) was applied to the internal surface of the veneer, and dried for one minute.

The teeth surfaces were etched for 20 seconds with 37% phosphoric acid and rinsed for 20 seconds. Excess water was removed with absorbent paper and an adhesive system was applied to the prepared surface (Excite DSC, Ivoclar Vivadent AG). Finally, the luting cement, A2 shade (Variolink Venner, Ivoclar Vivadent AG) was placed on the internal veneer surface before being placed onto the teeth preparation and the ceramic restoration was pressed lightly with the fingers. Excess interproximal cement was removed with a microbrush and dental floss. The veneer was then covered with a glycerin gel, and the resin cement light-cured on both surfaces for 120



seconds. After the margins were finished and polished, occlusion was checked and no adjustments were needed (Figure 8). The patient was booked for a recall 48 hours later in order to reassess occlusion and patient satisfaction (Figure 9).

### Conclusions

Porcelain veneers provide an outstanding esthetic result when clinicians select the proper treatment sequences, techniques and materials. Care needs to be taken during tooth preparation and particularly during the luting phase to ensure maximal esthetic results are obtained for the patient.

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### Disclosure

No conflicts declared.

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# Product Profile: Making the Right Impression for Your Patients and Practice

Brian K. Schroder, DDS

Introducing a new technology into your practice requires extensive analysis and consideration. It must meet the challenges and satisfy the clinical demands of your practice, your patients and lab partners. One such technology that truly meets these criteria is the 3M™ ESPE™ Lava Chairside Oral Scanner C.O.S. It is my opinion that digital impressing has achieved the status of the gold standard in restorative dentistry. Computers operate with an efficiency and an accuracy that conventional materials cannot consistently attain. The following case illustrates how the Lava C.O.S. can provide excellent results in restorative dentistry from impressing to seating.

L'introduction d'une nouvelle technologie dans votre pratique nécessite une analyse et une considération poussées. Elle doit rencontrer les défis et satisfaire les demandes cliniques de votre pratique, de vos patients et des laboratoires participants. Une telle technologie rencontrant entièrement ces critères est le 3M™ ESPE™ Lava Chairside Oral Scanner C.O.S. À mon avis, l'empreinte numérique est devenue le « Gold Standard » de la dentisterie restauratrice. Les ordinateurs opèrent avec une telle efficacité et précision comparativement aux matériaux conventionnels. Le cas qui suit illustre comment le Lava C.O.S. fournit d'excellents résultats en dentisterie restauratrice de l'empreinte à la mise en bouche.

## Case Report

The patient, a 79-year-old female, presented to the office with a failed fixed partial denture #17 x x 14. The prosthesis had failed due to recurrent caries beneath the mesial abutment. The patient was given all options for replacement of the failed restoration. She chose to have us fabricate a new ceramometal fixed partial denture. Following accepted restorative protocols, the old prosthesis was

removed and all decay beneath the abutments was excavated (Figure 1). FluoroCore® (Dentsply, Inc., Woodbridge, ON) was used as a foundation for the preparations which were then refined to support a four-unit fixed partial denture. Its design included a semi-precision slot connection between the pontic #16 and abutment tooth #15.

We then proceeded to isolate the

teeth in order to scan the full arch using the Lava C.O.S. After verifying that 100% of the preparations were captured in the scan, the jaw relation was recorded by the scanner with the patient closed into centric occlusion. A provisional restoration was fabricated and the patient dismissed. The digital information, along with a digital prescription was transferred wirelessly to the Authorized Lava Design Center. The lab used the

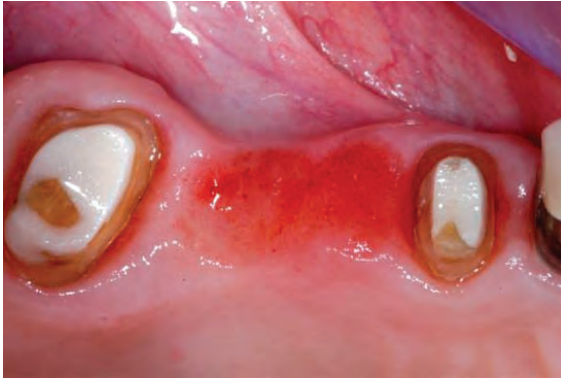


Figure 1. Decay was excavated and a core build-up was performed.

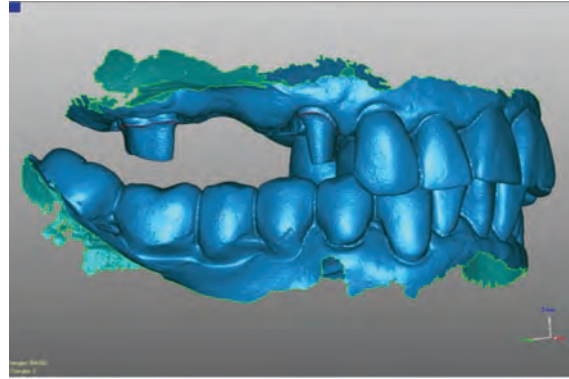


Figure 2. A fully articulated 3-D model is electronically sent to the lab and model manufacturing facility.



Figure 3. The lab receives a highly accurate stereolithographic (SLA) model.



Figure 4. The SLA model with the restoration in place.

digital files to mark the margins. The virtual model is then sent to a model manufacturing facility to produce a stereolithographic (SLA) model (Figure 2 and Figure 3). This model was then used for fabrication of the prosthesis using the same techniques which would be followed if using gypsum die stone. The difference is that the digital information does not change dimension in any way after it is captured by the scanner. The same cannot be said for conventional impression materials.

In this case, we placed the final restoration without any adjustments needed. This has become the norm since incorporating the Lava C.O.S. (Figure 4) The fit of the restorations is so accurate that rarely are any adjustments needed, provided that the provisional restoration satisfies all requirements. The patient was ecstatic about the complete treatment process and she was truly amazed at the difference this new technology brings (Figure 5).

### The Benefits of Digital

When implementing the Lava C.O.S. in my practice my goal was to provide an increased benefit to the patient through delivering a higher quality restoration. In the end the benefits of the Lava C.O.S. extend to my practice as well. Dentists using the system report a 41% reduction in



Figure 5. The final restoration placed in the mouth.

seating times for single-unit crowns (Source: 3M internal data) and remake rates due to marginal fit are 80% lower than the industry average (Source: 3M internal data and NADL 2007 data). In fact, since using the system in my practice, only six units of 250 have required modification prior to cementation. None of the errors were related to the scanner. My experience with the first 250 units scanned has been exceptional from both the perspective of my patients and my own. With experience and with continued software improvements from 3M, I see no tarnish on this technology.





## Our Four Main Objectives

The Canadian Academy of Restorative Dentistry and Prosthodontics (CARDP) is a not-for-profit, member-based organization that has Four Main Objectives:

- (1) To promote the improvement of the health of the Canadian public, through the advancement of the art and science of restorative and prosthetic dentistry.
- (2) To promote the highest standard of professional ethics among its members and amongst the members of the dental profession.
- (3) To encourage the quality and the quantity of teaching of restorative and prosthetic dentistry in Canadian university dental schools.
- (4) To provide continuing education in restorative and prosthetic dentistry for its members and for members of the dental profession in Canada.

The membership of CARDP consists of invited and proposed (sponsored) individuals who have earned peer recognition for their aptitude in the practice or teaching of restorative dentistry and/or prosthetic dentistry.

## Nos quatre buts principaux

L'Académie canadienne de dentisterie restauratrice et de prosthodontie (ACDRP) est un organisme sans but lucratif dont les membres poursuivent quatre objectifs principaux :

- (1) Promouvoir l'amélioration de la santé des Canadiens par le biais de l'art et de la science de la dentisterie restauratrice et prothétique.
- (2) Améliorer les normes d'éthique professionnelle parmi ses membres ainsi que les membres de la profession en général.
- (3) Soutenir la qualité de l'enseignement de la dentisterie restauratrice et prothétique dans les facultés dentaires canadiennes.
- (4) Offrir de l'éducation continue à ses membres ainsi qu'aux membres de la profession au Canada en dentisterie restauratrice et prothétique.

Les membres de l'ACDRP sont des individus, invités ou recommandés (commandités) qui ont mérité l'approbation de leurs pairs pour leurs aptitudes dans la pratique ou l'enseignement de la dentisterie restauratrice et/ou prothétique.

# Effective Business Systems Enhance the Delivery of Quality Dentistry and Will Impact Your Bottom Line!

By Ms. Jo-Anne O'Connor-Webber

It's Tuesday morning, following a long weekend and you are driving to work – which business owner are you?

## The Confident Owner

You feel refreshed. You've enjoyed your weekend but you are looking forward to starting your work week and catching up with your team. You are confident that you will arrive at your office to a properly scheduled day. With the assistance of your talented team you know you will be able to address the usual patient emergencies which often present in the dental office after a long weekend. At this time in your career everything is where you want it to be. Your practice vision has been clearly communicated and supported by all

team members. Both your personal and practice goals are being reached.

You are surrounded by an enthusiastic and skilled team. Your business systems and protocols are established and being seamlessly executed. Your practice environment exudes an aura of professionalism offering a welcoming décor, proven technologies, and up to date office and clinical equipment. This combination allows you and your clinical team to deliver the quality of dentistry you would expect to receive if you were your patient. You and your team are proud of the service you collectively provide every day.

Your well planned and executed financial and time investments will

provide your family with a future of security. Your practice overhead is easily managed with enough reserves to compensate your team at a level which leaves them knowing they are respected and appreciated for their talent and commitment. You have heard comment that your colleagues are envious of your overall positive outlook and successful practice. You know you are fortunate and humbly ask yourself, "How did it all come together when at one time it all seemed so far away?"

## The Discouraged Owner

You can't believe it is Tuesday already! You feel as though you have worked all night and mentally you have been as your subconscious was trying to find solutions to the anticipated



## About the Author

*Jo-Anne O'Connor-Webber is the president of IPCA, the developer of "Dental CATALYST Solutions," and a certified DISC behavioural studies trainer. Over the past 25 years, Jo-Anne has mastered the roles of: business manager, treatment coordinator, software trainer, practice management consultant, and mentor in the specialty and general dental practice.*

*Since 1984, Jo-Anne has been "hands on" in the prosthodontic, paedodontic, periodontic, orthodontic, and general dentistry practices. She has held integral business roles in practices that provide full mouth rehabilitation, implant placement and restoration as well as laboratory services. Jo-Anne continues to train dental teams on how to effectively educate patients on the benefits of comprehensive dentistry utilizing the case presentations skills taught in her consulting. She can be reached at: Phone: 519-886-6872; Email: [info@dentalcatalystsolutions.com](mailto:info@dentalcatalystsolutions.com); [www.dentalcatalystsolutions.com](http://www.dentalcatalystsolutions.com).*

chaos of your post long-weekend return to work. You know that you are going to be behind in your schedule from the time you arrive.

Your once loosely defined practice vision is a faint memory. When someone asks you about your team you silently groan. Every day you ask yourself, "How am I going to 'change' and 'grow' these individuals enough to meet the demands of today's dental practice?" When you think about your systems, you ask yourself, "What systems?" There seems to be no consistency! Your entire practice needs a facelift. Your operatory and office equipment is worn and you are about to provide your service technician with their own key to your office. You didn't sign up for the potentially complex business of dentistry you signed up to treat patients.

It takes all of your energy each day to survive in your operatory and you ask yourself "What happened to my passion for clinical dentistry?" "How do I turn this around?" "Can I turn it around?"

Although neither of these profiles may be your situation *exactly*, I am certain you can relate to or know someone who fits the generalizations I've outlined.

To "The Confident Owner" I want to say congratulations! I applaud you because I know that this success did not come without hard work, trials, and perseverance while still holding your vision of success in front of you. This indicates that you are an individual committed to constant improvement. My caution to you is to be aware that current results may not translate into future success. Our past successes do not offer us the luxury of putting aside continual assessment and monitoring of ourselves, our support team and the daily operations of our practices. This concept is well presented in the world renowned book by Stephen R. Covey, *The 7 Habits of Highly Effective People*<sup>1</sup> with his Habit Number 7: Sharpen the Saw.

To "The Frustrated Owner" I want to say don't give up! If you once had the passion and drive for clinical dentistry, but the business of dentistry has beaten you down you can find that passion again.

To the rest of you who fall somewhere in between these two profiles, I challenge you to not settle and continue to strive to reach your potential!

Before going any further, I must make it perfectly clear that I am not of the belief that there is only one "perfect practice" model. More importantly, it is not profitability alone that dictates whether or not your practice is successful, although it is a necessary ingredient. The ideal practice is a very personal vision for each practice owner.

Remember there are no magic bullets or short cuts to achieving the success you desire in your practice. Success lies within the discipline of our daily habits.

Often it is clear to us that we need to make changes, but when we take the time to make an honest assessment of our practice the change process is commonly stopped with the question of where do I begin?

Sometimes instead of redesigning our practice systems we merely patch them. Not dissimilar to the heavily restored tooth, which has been continually patched, it is only a matter of time before the unsupported structure crumbles. The decisions we now face may be more complicated than they needed to be.

In an ideal world each of you would have had the opportunity before you saw your very first patient to incorporate specific business systems developed by people who had the necessary experience to do so. This coupled with your clinical expertise would put you on the fast track toward your objective of owning a successful practice.

Unfortunately, the reality is that you may find yourself immersed in your practice and now you have a challenge that could be compared with that of a mechanic who has to find a way to repair an engine without shutting the car off! It is my desire in writing these articles to share with you recommendations, experiences and, of course, solutions to some of the challenges many face in your practice. This series is especially for the owner-doctor, or soon to be owner-doctor, who desire the opportunity to make assessments of their own practice business systems, but may not have known where to start in the process.

For some of you it will mean a complete redesign of those practice business systems and for others it may only involve a few minor adjustments to your daily routine.

It is not uncommon for people when making the decisions to incorporate change in their

business (or personal life) to overestimate the result of the change in the short term and underestimate the result of the change in the long term. Small daily improvements plus time equals quality long term results!

### Think Long Term – Act Today!

In writing this series I will draw from my 25 years of hands on business experience in specialty and general dental practices.

In the mid 1980s, I was introduced to two dental specialists who were passionate about both their profession and their patients. They loved to teach and I loved to learn. They gave me the foundation of clinical understanding and allowed me the freedom to develop and continually expand upon my business role in their practices. As a result, I remain to this day, passionate about customer/patient service with a commitment to finding solutions which make the business side of dentistry function more effectively.

Throughout the 1990s, restorative specialty practices experienced growth while incorporating the new modalities of treatment which were offered to the patient. It was imperative to the success of these practices that all areas of the business underwent scrutiny. It started with a clinician whose focus was 100% on the care of the patient. These years were not without frustration and setback as there were few individuals with the experience to assist us through this period. During this time, restorative treatments saw prosthodontists and surgeons collaborating together in their clinical environment to perfect implant placement and restoration. While they toiled in their operatories, the administrative and support team simultaneously were required to develop comprehensive support systems for the delivery of these treatments.

The importance of reflecting on this lies in the fact that many of the treatments we recommend and routinely provide to our patients today came as a result of the efforts of those individuals sharing their failures and successes with our industry as a whole. The business support systems developed and refined during that time had to support the presentation of cutting edge treatments that required of our patients an unprecedented financial investment. Today, both specialty and general practices require these business systems to function effectively in order to enhance the delivery of the standard of care today's educated patient not only expects, but demands.



**Where To Start?**

It starts with you! You are the CATALYST to the future success of your practice! Right now, before you close this journal, I want you to ask yourself “Is my practice 100% the practice I envisioned?” I challenge you to honestly answer this question today!

If the answer is yes, then please refer to the comments made to the “Confident Dentist” above. If the answer is no: let’s get started!

**Step One: Creating Your Practice Vision**

This does not have to be a lengthy exercise, in fact, the shorter the better. Just write one! Display it in places you frequent regularly. Putting pen to paper can energize and guide you. For example, part of your vision may be to be known as a clinician who provides the highest standard of patient care. Once you have this framework for your practice in place all decisions must move you towards this goal.

**Step Two: Leadership and Your Team**

Although the primary focus of this series will be on the business systems in your practice, it is important to acknowledge that systems are managed and people are led, therefore your practice team must be discussed.

Since my decision to provide Catalyst Consulting for dental offices beginning in 2001, I have stood behind the principle that the level to which your practice succeeds is entirely determined by the quality of your team. You are the leader of that team!

Being the leader of your team does not mean that you must be the expert in all areas of your practice. Nor does it mean that you must have all the answers which would be unrealistic.

Being practice leader means that you have an expectation of these goals and the accountability in leading your office in that

direction. Each day you must work in incremental steps to move towards that vision by asking yourself, “How can we do what we’re doing better?” A leader must encourage those on their team to incorporate these strategies into their individual areas of responsibility.

Leadership is developed daily as well as overtime and through a conscious effort to do so.

As the practice leader it is also up to you to develop (or hire people to develop) the systems and tools required by your practice. It is then imperative that the team is thoroughly trained in their effective use. Team members should be encouraged when using these systems and tools to make recommendations for potential improvement based on their experiences.

With this written vision as a guide, you must make an objective assessment of each of your team members. Although a plethora of information and recommendations on how to hire the right team is available from a variety of sources, listed below are fundamental questions to be asked regarding every individual interacting with your practice. Are they:

- Trustworthy?
- Receptive to and in agreement with your practice vision?
- Able to easily connect with people – both patients and other team members?
- Enthusiastic about, and committed to, continual learning and self improvement?
- Skilled enough to adequately accomplish their daily required responsibilities?
- Accountable to their own success?

**Hire the Best, Train the Best, Keep the Best!**

Ideally, the team members you currently have in your office can be trained and groomed

into the team you need. It is important that we hire the best, train the best, and keep the best team possible. While in a perfect situation you may choose not to keep team members who do not meet some of the above requirements and may have a negative impact on your practice, I caution you against making hasty decisions. First, experience has taught me that the available talent pool for hiring is likely not as plentiful as one may initially think. Before replacing a team member, I often recommend that you complete a very careful assessment of their skills, abilities, and attitudes. Following this assessment, discuss with the individual those areas that they may require additional training and coaching. Once the process begins, monitor their improvement.

If after taking these steps the decision is made to replace the team member in question, I would strongly advise you to seek counsel with your attorney in regards to the proper employee dismissal requirements.

A properly trained team are better capable of effectively executing and managing systems thus contributing to a smoothly running and more profitable practice.

**Step Three: Assessing Your Systems**

Before you can determine which systems in your practice require your attention you will need to complete a careful assessment. In subsequent articles we will take a close look at each of these areas and their associated systems. Our objective is to assess your practice systems in order to ensure that they can support the demands of today’s successful restorative dental practice.

**References**

1. Covey SR. The 7 Habits of Highly Effective People. New York: Fireside, 1990.

**Rate the Following Areas of Your Practice**

	Excellent	Somewhat Adequate	Inadequate	Not Sure
Administrative Systems				
New Patient Protocols				
Case Presentation				
Patient Case Acceptance				
Scheduling				
Active Patient Management				
Patient Finance Management				
Referral Management				
Lab Case Management				
Practice Success Monitors				

## A Picture of Health: BC Dentists Help Olympic and Paralympic Athletes' Smiles

As excitement builds toward the Vancouver 2010 Olympic and Paralympic Winter Games, athletes are preparing for the final stretch before they take to the world's stage in a display of excellence in their respective sports.

Similarly, approximately 72 dentists and dental assistants are preparing, not for speed skating, ice hockey or even luge, but for their roles as volunteers at the Games.

"It's my understanding the dental clinic will be the second busiest health-related service at the Olympic Games," explained Dr. Chris Zed, associate dean, strategic and external affairs and head, postgraduate and hospital programs of the faculty of dentistry at The University of British Columbia (UBC). "It's a combination of the nature of high impact winter sports and the varying degree of importance countries place on oral health worldwide."

If athletes choose to visit one of the two dental clinics set up specifically for the 2010 Winter Games, the program Zed and his fellow dental manager, Dr. Mark Parhar, designed will educate athletes on how certain behaviours, such as diet, tobacco use, sun exposure, and good teeth maintenance with flossing and brushing, affect their overall health.

With over 800 dental encounters recorded at the Torino 2006 Olympic Winter Games in Italy, the team expects to be busy at polyclinics. Located in the Olympic and Paralympic Villages in Whistler and Vancouver, the polyclinics are central locations for all types of medical care including dentistry. Here the volunteer dental staff will perform various levels of care from teeth cleaning to full restorations.

"In some acute cases, athletes will be assessed

at the venue where the accident happens," said Zed. "Also, due to the nature of men's ice hockey, the ice hockey arena will have dentistry coverage on-site."

The volunteer team is made up of UBC dentistry alumni and interested dentists throughout Vancouver and the lower mainland. Each must be licenced, practicing dentists, assistants or hygienists.

This standard of excellence is upheld in the products the volunteers use as well. Working with Sinclair Dental, a major distributor and friend of the 2010 Winter Games, the program gained access to 3M, the Official Supplier of Large Format Graphics for the 2010 Winter Games.

"Knowing 3M's commitment to Vancouver 2010 as an Official Supplier and because I am familiar with its dental products from my own practice, I described the volunteer program to my contact there who decided to donate materials and loan us equipment," said Zed.

3M ESPE will exclusively provide all products possible such as composites, adhesives and impression materials.

As the dentistry supervisors, Zed and Parhar will be available every day for troubleshooting between the two polyclinics and jumping in to help when needed.

"Our goal is to help athletes excel both during and after the Winter Games," said Zed. "If they return to their countries with a greater appreciation for their oral health, and higher expectations of dental service in general, then we did our job."

[www.dentistry.ubc.ca](http://www.dentistry.ubc.ca)  
[solutions.3mcanada.ca/wps/portal/3M/en\\_CA/3M-ESPE/dental-professionals/](http://solutions.3mcanada.ca/wps/portal/3M/en_CA/3M-ESPE/dental-professionals/)

## Nobel Biocare Establishes Preferred Partner Program with Ivoclar Vivadent

The collaboration with Ivoclar Vivadent will offer Nobel Biocare additional access to high-performance ceramic and acrylic prosthetic materials, thereby enabling Nobel Biocare to expand its leading restorative and prosthetic portfolio through new products, solutions and materials. This partnership also includes the development of new materials, joint educational and training programs and commercial activities.

Preferred Partner Program with leading dental material providers Nobel Biocare has initiated a Preferred Partner Program with selected dental material providers with the goal of further strengthening NobelProcera's leading market position in CAD/CAM-based dentistry. The resulting collaborations will afford Nobel Biocare access to a wider range of state-of-the art and high-performance dental materials, and thus enable it to offer customers an even broader portfolio of restorative and prosthetic solutions. Nobel Biocare's extended offer will include new products, better veneering solutions, cost-effective treatment options and complete solutions for edentulous indications.

"As a leading materials company we see a partnership with Nobel Biocare as an ideal combination of premium skills – milling systems and materials", said Robert Ganley, CEO of Ivoclar Vivadent. NobelProcera is a leader and pioneer in CAD/CAM dentistry while Ivoclar Vivadent is a market-leading materials company with innovative ceramics, such as IPS e.max CAD, and a unique acrylic provisional material system that is due to be launched in 2010."

[www.nobelbiocare.com](http://www.nobelbiocare.com)  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

## Tooth-Binding Micelles Containing Antimicrobials May Provide Long-Term Cavity Protection

A new study suggests that tooth-binding micelles may provide long-term cavity protection by adhering to tooth surfaces and gradually releasing encapsulated antimicrobials. Formulation of a mouthwash-based delivery system is anticipated, ultimately simplifying application and increasing at-home patient compliance. Richard Reinhardt and his colleagues from the University of Nebraska Medical Center, Omaha and the University of Florida, Gainesville reported their findings in the November 2009 issue of the journal *Antimicrobial Agents and Chemotherapy*.

[www.sciencedaily.com/releases/2009/11/091119212148.htm](http://www.sciencedaily.com/releases/2009/11/091119212148.htm)





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<sup>1</sup> Valid for new Lava™ C.O.S. doctors until one year after certification date. Fit Guarantee covers any restoration sent back to the lab because of marginal fit. See contract for full details.

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## **Lava™ Chairside Oral Scanner C.O.S. from 3M ESPE Now Available In Canada with Fit Rate Guarantee**

London, Ontario. – (March, 2010) – 3M ESPE is excited to announce the launch of the Lava brand Chairside Oral Scanner into the Canadian marketplace; the only 3D video capture system in dentistry today is now the only digital impression system to guarantee restoration fit.

Dentists using the system have reported a 41 percent reduction in seating times for single unit crowns<sup>1</sup> and a remake rate due to marginal fit that is 80 percent below the reported industry average.<sup>2</sup>

The Lava C.O.S. from 3M ESPE is the only digital impressing system on the market that has elevated the process from merely taking pictures to capturing video. With Lava C.O.S. 3D-in-Motion technology, doctors can capture and simultaneously view continuous 3D video images to create a digital impression on a touch screen monitor.

Doctors can assess their preparation and margin using several review features unique to digital dentistry and specify either a traditional (PFM) or CAD/CAM restoration, including a Lava restoration. The digital prescription is sent to the Doctor's lab for marking the margin and cutting the die. The process is complete once the lab receives a technologically advanced stereolithography (SLA) model for finishing, and ships the final restoration back to the doctor.

Any dentist can purchase a Lava C.O.S. and any lab can participate in the digital workflow, utilizing a business model that requires no capital investment from a lab and allows doctors to work with their existing labs.

3M ESPE is so confident in this product it is ensuring the accurate fit of restorations created using its Lava Chairside Oral Scanner C.O.S. with a one year guarantee for new doctors.<sup>3</sup> If the doctor chooses not to seat a restoration for reasons of fit, 3M ESPE will (after verifying eligibility)

- Issue the practice credits for two case fees
- Compensate the lab \$100 to help defray the remake cost
- Provide an analysis about the reason(s) for the misfit to the doctor and lab

All approved indications for the Lava C.O.S. are covered by the guarantee, including single or multiple crowns, inlays, onlays, veneers, seated implant abutments and bridges up to 4 units.

Eligibility applies to new certified doctors of practices in good standing, as well as trained and certified laboratories in good standing producing restorations for eligible doctors only. The one-year duration of the guarantee begins on the practice's certification date.

The program highlights the accuracy of the system and demonstrates the commitment of 3M ESPE to customers who purchase this powerful technology.

For more information, visit [www.3MESPE.ca/lavacos](http://www.3MESPE.ca/lavacos) or call 1-888-363-3685.

*3M ESPE manufactures and markets more than 2,000 products and services designed to help dental professionals improve their patients' oral health care. 3M Health Care, one of 3M's six major business segments, provides world-class innovative products and services to help health care professionals improve the practice and delivery of patient care in medical, oral care, drug delivery and health information markets. For more information on the complete 3M ESPE line of dental products visit the 3M ESPE Web site at [www.3MESPE.ca](http://www.3MESPE.ca)*



<sup>1</sup> Source: 3M internal data

<sup>2</sup> Source: 3M internal data and 2007 NADL data

<sup>3</sup> Valid for new Lava C.O.S. doctors until one year after certification date. Fit guarantee covers any restoration sent back to the lab because of marginal fit. See contract for full details.

From:

3M ESPE

Dental Products

300 Tartan Drive

London Ontario, N5V 4M9





## **Ivoclar Vivadent Announces IPS Empress® Direct Road Tour**

*Hands-on Composite Course Features Renowned Clinicians*

Amherst, NY (February, 2010) – Ivoclar Vivadent is pleased to announce its **2010 IPS Empress Direct Road Tour**. These in-depth Continuing Education programs are scheduled across the United States and Canada and will include comprehensive lectures and hands-on components so participants can master the use of IPS Empress Direct.

IPS Empress Direct is a light-curing, nano-hybrid composite that demonstrates exceptional handling properties for achieving consistent anterior esthetics, similar to ceramics, but with the on-demand ease of composite. Based on the latest technology, IPS Empress Direct features a broad range of true-to-nature™ dentin and enamel shades, as well as translucencies and opacities that create limitless opportunities for realizing esthetic results for all indications, including those in the posterior segment.

“We are honored to have such an esteemed group of clinicians leading these CE programs and demonstrating the simplicity with which IPS Empress Direct can be used to achieve superior esthetic and functional direct restorations,” said Lisa Stronka, marketing manager for IPS Empress Direct.

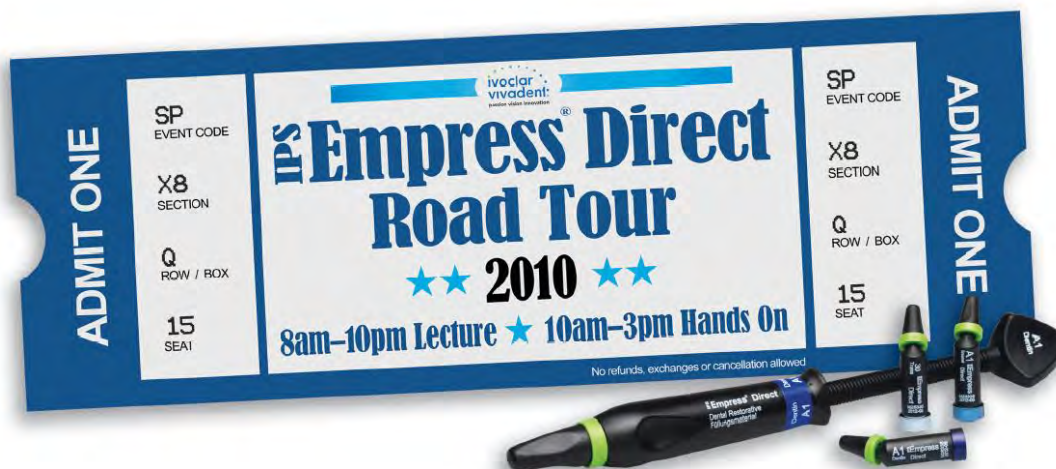
**(more)**

Drs. Robert Lowe, Ed Lowe, Doug Lambert, Chris Ramsey, Rob Ritter, Ron Goodlin, Elliot Mechanic, and Wilson Kwong are among the instructors scheduled on the tour.

The program fee is \$399 (US) or \$450 (CA) and participants will receive 6 CE Credits. The lecture and hands-on programs will emphasize the versatility of IPS Empress Direct and provide an overview of the material's chemistry, explain the rationale for different enamel and dentin formulas, outline indications for use, and demonstrate techniques for conserving natural tooth structure. All participants will also receive an Empress Direct Tour Kit which includes a variety of materials and accessories for direct composite restorations.

**For additional information or to register, please go to:**

<http://www.ivoclarvivadent.us/empressdirect>





## IPS Empress Direct 2010 Tour Dates & Locations

<b>DATE</b>	<b>CITY</b>	<b>COUNTRY</b>	<b>SPEAKER</b>
Friday, March 5	Edmonton, AB	Canada	R. Goodlin
Friday, March 26	Chicago, IL	USA	R. Ritter
Friday, April 09	Markham, ON	Canada	R. Goodlin
Saturday, April 10	San Francisco, CA	USA	E. Lowe
Friday, April 23	Boston, MA	USA	B. Lowe
Friday, May 7	New Orleans, LA	USA	C. Ramsey
Friday, May 14	Vancouver, BC	Canada	W. Kwong
Friday, May 21	Minneapolis, MN	USA	D. Lambert
Friday, June 4	Calgary, AB	Canada	W. Kwong
Friday, June 11	Sacramento, CA	USA	E. Lowe
Friday, June 18	Quebec City, QC	Canada	E. Mechanic
Friday, June 25	Long Island, NY	USA	R. Ritter
Friday, July 9	Austin/San Antonio, TX	USA	C. Ramsey
Friday, July 23	Indianapolis, IN	USA	D. Lambert
Friday, August 6	Philadelphia, PA	USA	C. Ramsey
Friday, August 20	Dallas/Ft. Worth	USA	C. Ramsey
Friday, September 3	Seattle, WA	USA	E. Lowe
Friday, September 17	Detroit, MI	USA	B. Lowe
Friday, September 24	Montreal, QC	Canada	E. Mechanic
Friday, October 1	Salt Lake City, UT	USA	D. Lambert
Friday, October 15	Raleigh, NC	USA	C. Ramsey
Friday, November 5	Oklahoma City, OK	USA	B. Lowe
Friday, November 19	Sherbrooke, QC	Canada	E. Lowe
Friday, November 19	Kansas City, MO	USA	D. Lambert
Friday, December 3	Los Angeles, CA	USA	E. Lowe
Friday, December 17	Washington DC	USA	B. Lowe

For more information, call 1-800-533-6825 in the U.S.,  
1-800-263-8182 in Canada.