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Today's Surprisingly Versatile, Esthetic & Durable Metal-Free Alternative

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Immediate Dentures

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The Science Behind Lithium Disilicate:

Today's Surprisingly Versatile, Esthetic & Durable Metal-Free Alternative

George W. Tysowsky, DDS, MPH,
Vice President, Ivoclar Vivadent

Dentists and laboratory technicians today require materials that offer outstanding esthetics, high strength and efficient productivity. Historically, dentistry also has always been faced with the challenge of finding ways to combine two incompatible materials in a synergistic way, whether that combination is metal with metal-ceramic or zirconia with zirconia layering ceramic. Simultaneously, dental practices and dental laboratories increasingly are seeking ways to realize the wonderful opportunities presented by CAD/CAM and digital fabrication techniques that offer the benefits of consistency in the production of a restoration and expanded material options.

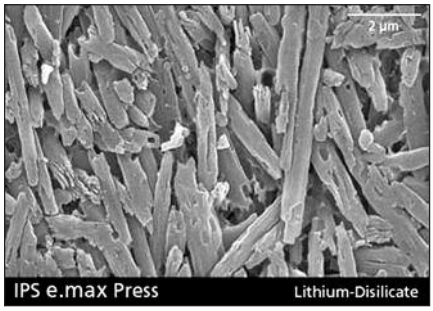
To satisfy these requirements, lithium disilicate glass ceramic represents a material like no other available in the dental industry. What's more, lithium disilicate has the present and future potential to provide new options for improving patient care.

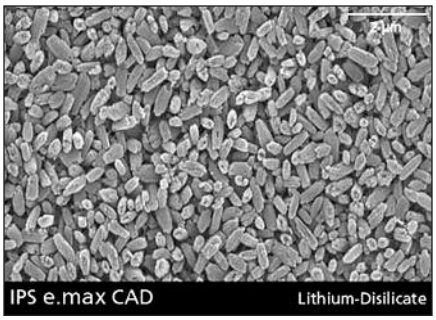
For the dentist, lithium disilicate is a highly esthetic, high strength material that can be conventionally cemented or adhesively bonded.[1] In terms of dealing with incompatible restorations, lithium disilicate offers a unique solution with its ability to offer a full contour restoration fabricated from one high strength ceramic, thereby eliminating this challenge. What's more, it is a material that can be used in all areas of the mouth when specific considerations are accounted for. For laboratory ceramists, the versatility and performance of lithium disilicate enable them to optimize their productivity when fabricating restorations using this material, since either lost-wax pressing or CAD/CAM milling fabrication techniques can be used. In particular, the Ivoclar Vivadent lithium disilicate materials (IPS e.max® Press and IPS e.max® CAD) maximize these benefits for laboratories and dentists.

What Is Lithium Disilicate?

Glass ceramics are categorized according to their chemical composition and/or application.[2] Lithium disilicate is among the best known and most widely used types of glass ceramics. The IPS e.max lithium disilicate, for example, is composed of quartz, lithium dioxide, phosphor oxide, alumina, potassium oxide, and other components. Overall, this composition yields a highly thermal shock resistant glass ceramic due to the low thermal expansion that results when it is processed. This type of resistant glass ceramic can be processed using either well-known lost-wax hot pressing techniques or state-of-the-art CAD/CAM milling procedures.

The pressable lithium disilicate (IPS e.max Press) is produced according to a unique bulk casting production process in order to create the ingots. This involves a continuous manufacturing process based on glass technology (melting, cooling, simultaneous nucleation of two different crystals, and growth of crystals) that is constantly optimized in order to prevent the formation of defects (eg, pores, pigments). The microstructure of the pressable lithium disilicate material consists of approximately 70% needle-like lithium disilicate crystals that are embedded in a glassy matrix. These crystals measure approximately 3 *u*m to 6 *u*m in length. Polyvalent ions that are dissolved in the glass are utilized to provide the desired colour to the lithium disilicate material. These colour-releasing ions are homogeneously distributed in the single-phase material, thereby eliminating colour pigment imperfections in the microstructure. Machineable lithium disilicate blocks are manufactured according to a similar process, but only partial crystallization is achieved in order to ensure that the blocks can be milled fast in a crystalline intermediate phase (blue, translucent state). The partial crystallization process leads to the formation of lithium metasilicate crystals, which are responsible for the material's processing properties, relatively high strength, and good edge stability. It is after the milling procedure and the restorations are fired that they reach their fully crystallized state and their desired high strength. The microstructure of partially crystallized IPS e.max CAD lithium disilicate consists of 40% platelet-shaped lithium metasilicate crystals embedded in a glassy phase. These crystals range in length from 0.2 to 1.0 um. Post-crystallization microstructure of IPS e.max CAD lithium disilicate material consists of 70% fine-grain lithium disilicate crystals embedded in a glassy matrix.





Similar to the pressable lithium disilicate, the millable IPS e.max CAD blocks are coloured using colouring ions. However, the colouring elements demonstrate a different oxidation state during the crystalline intermediate phase than in the fully crystallized state. As a result, the blocks exhibit a blue colour. The material achieves its desired tooth colour and opacity when the lithium metasilicate is transformed into lithium disilicate (during the post-milling firing process).

Physical & Clinical Properties of Lithium Disilicate

At Ivoclar Vivadent, we believe lithium disilicate is now the best restorative material available today for single unit indirect restorations. Ivoclar Vivadent's lithium disilicate material — particularly IPS e.max Press and IPS e.max CAD — has been in clinical trials **for the last 4 years** with adhesive and self-adhesive/conventional cementation, and the results have been very positive. We continue to complete both in vivo and in vitro testing to enhance the material's performance and maximize its use clinically.

These tests have included mechanical testing of strength using static load with a universal testing machine; subcritical eccentric loading using a chewing simulator (Willytec); and a long-time cyclic loading with a chewing simulator (eGa). The results of these tests demonstrate that:

- To ensure maximum success using the lithium disilicate material, it is important to consider the minimum thickness of the lithium disilicate frame
- The inside of the crown should NOT be sandblasted
- Regardless of the in vitro test is performed, in comparison to various restorative dental material for crowns (eg, leucite glass ceramic, metal ceramic, zirconia), the lithium disilicate material demonstrates superior results

This is because the strength of the ceramic material in contact with opposing teeth, to fulfill masticatory functions, is about 100 MPa for veneering material, and about 160 MPa for leucite glass ceramic. However, for the pressed lithium disilicate (IPS e.max Press LT and HT), the strength is in the range of **360 MPa to 400 MPa** in its final anatomical shaped crown form.

Properties of IPS e.max Press

Table 1. Properties of IPS e.max® Press

CTE (100-400°C) [10^{-6}/K]*	10.2
CTE (100-500°C) [10^{-6}/K]*	10.5
Flexible strength (biaxial) [MPa]*	400
Fracture toughness [MPa $m^{0.5}$]*	2.75
Modulus of Elasticity [GPa]	95
Vickers hardness [MPa]	5800
Chemical resistance [µg/cm^2]*	40
Press temperature EP 600 [°C]	915-920

The pressable lithium disilicate material is indicated for inlays, onlays, thin veneers, veneers, partial crowns, anterior and posterior crowns, 3-unit anterior bridges, 3-unit premolar bridges, telescope primary crowns, and implant superstructures.[3,4,5] In some cases, minimal tooth preparation is desired (e.g., thin veneers), and IPS e.max lithium disilicate enables laboratories to press restorations as thin as 0.3 mm while still ensuring strength of 400 MPa. If sufficient space is available (eg, retrusion of a tooth), no preparation is required.

Properties of IPS e.max CAD

Table 2. Properties of IPS e.max® CAD

CTE (100-400°C) [10^{-6}/K]	10.2
CTE (100-500°C) [10^{-6}/K]	10.5
Flexible strength (biaxial) [MPa]*	360
Fracture toughness [MPa $m^{0.5}$]	2.25
Modulus of Elasticity [GPa]	95
Vickers hardness [MPa]	5800
Chemical solubility [µg/cm^2]*	40
Crystallization temperature [°C]	840-850

Indications for the machineable lithium disilicate material are inlays, onlays, veneers, partial crowns, anterior and posterior crowns, telescope primary crowns, and implant superstructures. For a posterior crown fabricated to full contour using CAD methods, lithium disilicate offers 360 MPa of strength through the entire restoration. As a result, restorations demonstrate a "monolithic" strength unlike any other metal-free restoration.

Overall, these materials demonstrate specific advantages to dentists and patients, including higher edge strength vs. traditional glass ceramic materials (ie, can be finished thinner without chipping); low viscosity of heated ingot enables pressing to very thin dimension (ie, enabling minimal prep or no-prep veneers); and chameleon effect due to higher translucency.

Conclusion

At Ivoclar Vivadent, we see lithium disilicate emerging as the restorative material of choice for single unit indirect restorations. Further, we believe that trends that have begun in North America are starting to have an impact in other economies around the world. Lithium disilicate increasingly is being integrated into the North American and Western European dental practice as an esthetic, high strength option for single unit dentistry, whether for anterior or posterior restorations. As technology continues to expand in Asia and developing nations, these markets are likely to embrace the same benefits from lithium disilicate that North American dentists and laboratories are experiencing today.

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George W. Tysowsky, *DDS, MPH serves as Vice President of Technology for Ivoclar Vivadent, Inc. In this capacity, Dr. Tysowsky is responsible for Research & Development activities for all North American operations. He also serves as a Clinical Assistant Professor at the State University of New York at Buffalo, School of Dental Medicine, and is a Fellow of the American College of Dentistry.*

Dr. Tysowsky earned a DDS degree from the University of Minnesota, School of Dentistry, and a Masters of Public Health from Minnesota's School of Public Health. He also completed a General Practice Residency at St. Francis Medical Center/University of Connecticut. Dr. Tysowsky has published and lectured extensively throughout North America and Europe on the application of contemporary materials.

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Do You Sell Flowers?

Dr. Louis Malcmacher

When I walk into many dental offices, sometimes I feel that they are selling big bouquets of flowers. Other times, I am sure that they are selling a condo or a house on the beach. In other dental offices, I could swear that it is either an art gallery or they are trying to sell paintings or knock-offs of famous art pieces. I was sure that one dentist that I went to visit was a farmer, because in his waiting room he had beautiful pictures of fruit.

Why would I think that dentists are selling flowers, condos, homes on the beach, art, and fruit? Because when I, and their patients, walk into their offices, there are big pictures of these items on the walls of the waiting room and treatment rooms. Well, here is my big question to those dentists. If you are not selling flowers or fruit, then why in the world do you have these things on your walls? Most businesses that you go into that actually sell something have beautiful pictures of whatever they are selling up on the walls. Dentists, for some strange reason, all of a sudden want to hide from their patients what they can do, and indeed, may be more comfortable selling flowers to their patients.

Like it or not, we are all selling something. What is your core business? It is delivering dental services to your patients and creating health, wellness and beautiful smiles. What you should have on your walls are big pictures of happy people with beautiful smiles because that is exactly what will help motivate your patients to accept treatment. Before and after pictures of smiles with Aurum Cristal Veneers (visit www.aurumgroup.com for details), total facial esthetics with Botox and dermal fillers or other cosmetic results that you have done should immediately take the place of anything else on your office walls. Why, because that is what you are looking to provide to your patients and indeed, that is what they are looking to receive from you.

The strong effect of before and after pictures can not be discounted in showing patients what you can do for them. For as long as I can remember, we have had before and after pictures of smiles in albums and up on our office walls. What I want to hear from the patient when I walk into the room is for them to point to a picture on the wall and say, "Hey, can you do that for me?" The answer obviously is. "Sure I can do that for you". That is basically my treatment presentation. You need to plant seeds in patients minds as to what you can accomplish for them. With elective esthetic dentistry, beautiful smiles on the walls are much more effective than flowers.

One of the most important lessons I learned from Fred Joyal, the marketing genius behind 1800DENTIST and www.goaskfred.com, is that you need to market the services that you perform specifically in your office, not promote the dental services that you refer out. If you don't do implants, then having that as a headline in your practice newsletter probably is not prudent. If you don't sell flowers, then stop promoting them in your office — or start selling flowers.

We can certainly learn a lot from other healthcare practitioners in the health and facial esthetic industry. Now that we are providing Botox and dermal fillers in our office and training dentists how to do these procedures, we have gotten very involved with other esthetic healthcare professionals. They have taught us how to truly inspire and motivate the patients who are looking for these treatments to go ahead with a combination of soft tissue and hard tissue esthetics. If you go into any medical spa, dermatologist or plastic surgeon's office, you won't see pictures of flowers on their walls. You will see big pictures of beautiful faces! As a matter of fact, if you go into any florist's shop, you will not see big beautiful smiles on the wall because that is not what they sell. They sell flowers, you don't!

The walls in your office should tell the story of what you are trying to sell. It is the best way to help motivate people to accept whatever services you provide. You sell health, wellness, oral hygiene prevention, esthetics, implants, laser procedures (with a Powerlase AT laser www.laresdental.com) and life changing treatment for people. Your office walls, if they could talk, would tell some incredible stories about what you have accomplished for people over your career as a dentist. Let your walls publicize and educate people about the great treatment options we now have in dentistry to make them look good, feel good, and improve the quality of their lives.

Louis Malcmacher *DDS MAGD is a practicing general dentist and an internationally known lecturer, author, and dental consultant known for his comprehensive and entertaining style. An evaluator for Clinicians Reports, Dr. Malcmacher is president of the American Academy of Facial Esthetics. You can contact him at 440 892-1810 or email dryowza@mail.com. His website is www.commonsensedentistry.com where you can find information about his lecture schedule and Botox and dermal filler live patient hands-on training schedule, audio cd's, download his resource list, and and sign up for a free monthly e-newsletter.*

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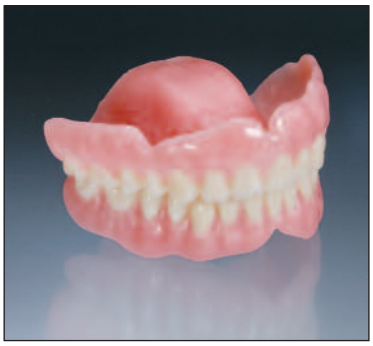
Immediate Dentures

Gary Wakelam, RDT, CDT

Most patients who are facing extraction as the final step to full dentures want to make the move to dentures as quickly and conveniently as possible. Yet, the procedure commonly involves an initial surgical appointment followed by at least three – six months to allow healing of the ridges before beginning to construct the final dentures. After that, impressions must be taken; dentures crafted, tried in and adjusted; and the definitive denture completed, all of which takes time and delays completion of treatment.



An all-acrylic "Immediate Denture" can ease the transition from natural dentition to dentures (either for single or double arch treatment) during this period by allowing the patient to "keep their teeth" while their gums are healing. Fabricated prior to removal of the patient's remaining teeth and delivered immediately after, they usually require only one short impression appointment before extraction and one appointment for placement of the dentures. Immediate dentures can even be created as partial dentures that will only replace certain teeth.

Even more important, Immediate Dentures may assist in resolving many clinical problems:

- The splinting action of the denture may help reduce the pain and swelling that can occur after oral surgery.
- Gums tend to heal to the shape of the dentures.
- Cheek and lip support are maintained (instant effect on appearance).
- Patient able to chew food and maintain proper nutrition during healing process.
- Adaptation easier (especially in upper front teeth) as able to mimic natural tooth position in jaws.

Since each patient's healing period and ability to accommodate an immediate denture varies, the feeling of being "comfortable" will be different. For the first week, the denture remains stable and reasonably retained. After this, as resorption occurs, the immediate denture is often relined on one or more occasions with a soft liner to help cushion the hard denture base against the healing extraction sites. If both upper and lower immediate dentures are being prepared, it is recommended that both be fabricated at the same time. This ensures that cosmetic or bite irregularities that existed in the natural teeth will not interfere with tooth positioning in the new immediate denture.

During the healing process, the patient may become comfortable with the appearance of the teeth and may not want a change. However, depending on the amount of resorption that occurs, the anteriors may need to be lengthened or the vertical slightly increased in the final denture.

- Single or double arch treatment. Can even be created as partials to replace certain teeth.
- Requires no healing period between extractions and placement of dentures.
- Allows patient to "keep their teeth" during healing period after extractions.
- Usually requires only one surgical appointment.
- Cheek and lip support maintained (instant effect on appearance).
- Serves as splint to reduce pain and swelling after oral surgery.
- Allows natural tooth position to be duplicated or altered as required.
- Permits test period for changes in tooth position before definitive dentures are made.
- Performs as spare/emergency denture after definitive dentures delivered (especially convenient during relines).

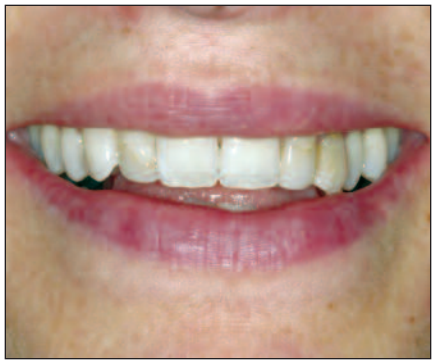
"This female patient originally came to us with a desire to improve her smile. She had a really interesting clinical situation in that she still had her 6-3 baby canine on the left side, which had resulted in her adult canine (tooth #2-3) being pushed back towards her palate. Her left lateral was also a noticeably tiny peg lateral.

We presented a number of treatment options to her, beginning with the extraction of the baby canine and the use of fixed orthodontics to move her remaining dentition into a more pleasing alignment. The second option was to extract both her baby and adult canines and replace them with a single crown on an implant. The patient did not want either of these options. Instead, she initially chose to proceed with extraction of both 6-3 and 2-3 canines and the placement of a three-unit bridge from 2-2 to 2-4. As the peg lateral at 2-2 was too small to support a bridge, the preparation was extended to include 2-1 and a four-unit bridge was accepted. As our discussions continued, she mentioned the large old stained composite she had on 1-2 and inquired about veneering this tooth. As we considered her smile, we also decided to veneer 1-1 as well to assist in matching the shape and colour of the various restorations. After extraction, a temporary bridge was placed to allow the gums to heal with a nice ovate pontic site at 2-3.

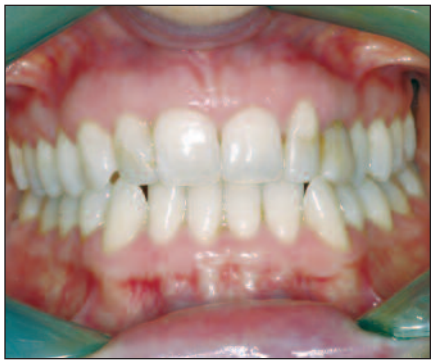
The Aurum Ceramic/Classic AE (Advanced Esthetic) Team crafted a beautiful four unit Contessa® Bridge (2-1 to 2-4) and IPS Empress Esthetic veneers on 1-1 and 1-2. The shade match between Empress, Contessa and the remaining natural dentition was superb. Everything fit perfectly with the Cadent iTero impression system and looked wonderful. The patient was absolutely thrilled with the final result, as evidenced by the big smile in her final Full Face photograph."

Gordon Chee, DDS

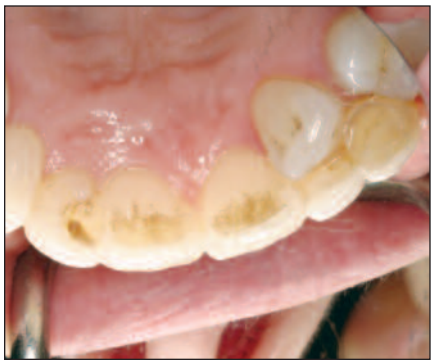
Full Face Before.



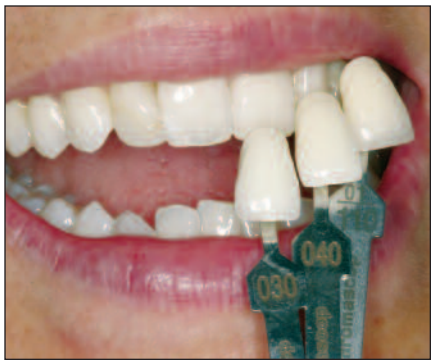
Close-up of pre-operative smile.



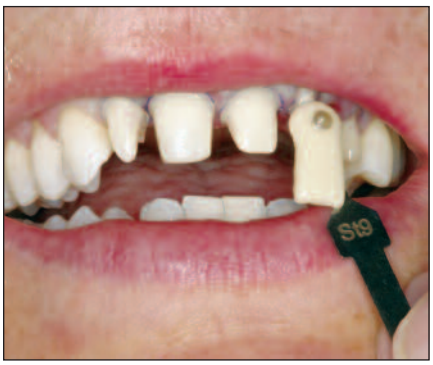
Retracted pre-operative smile.



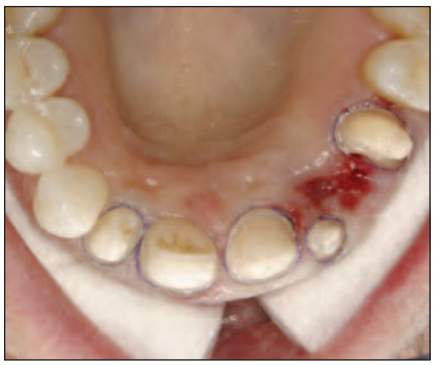
Initial situation – upper arch.



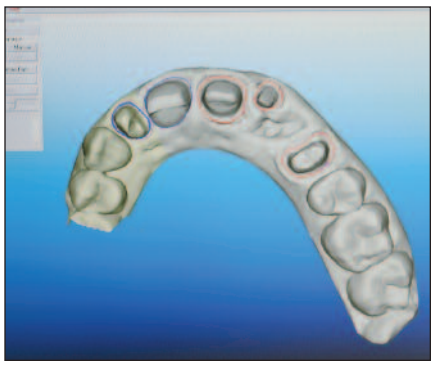
Shade selection.



Preparations and stumpf shade selection.

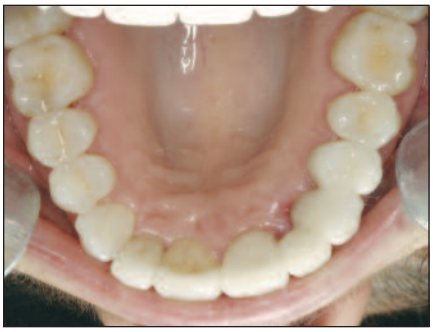


Upper arch preparations.

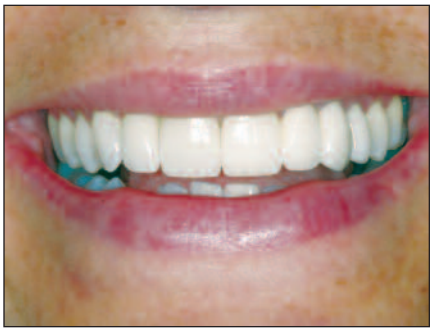


Cadent iTero scan of area of upper arch.

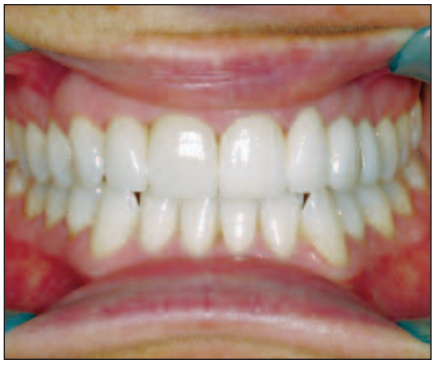
Cadent iTero scan of preparations.



Upper arch after placement of bridge and veneers.



Close-up of new smile.



Retracted restored smile.

Full face After.

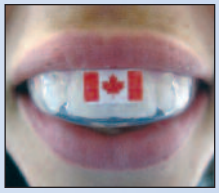
Restorations fabricated by Aurum Ceramic/Classic.

Dr. Gordon Chee completed his dental degree at the University of Alberta in 2000, and began practicing general and cosmetic dentistry in Vancouver. Originally from Lethbridge, he returned to Alberta, joining the Aesthetic Dental Studio in Calgary in February 2006. Dr. Chee has completed a number of courses at the Las Vegas Institute for Advanced Dental Studies (LVI) including Advanced Functional Aesthetics; Advanced Adhesive Aesthetic Dentistry; Occlusion I and II; Neuromuscular Implants I; Sleep Breathing Disorders; Comprehensive Aesthetic Reconstruction; Scan Interpretation; and Coronoplasty and Case Finishing. He has completed the D.O.C.S. Conscious Sedation program and is an Invisalign and PPM preferred provider.

Dr. Chee has appeared on a variety of media outlets including CTV News, Global TV News, and National Post for the Velscope Oral Cancer Device; Global TV News for the Cadent Itero Digital Impression Scanner; and Canwest News Service, Canada.com, Lifestyles Magazine and Best Health Magazine for Aesthetic Dentistry.

The Vancouver 2010 Winter Olympic Games Mouthguard Program

Dr. Mark Parhar



The Vancouver 2010 Winter Olympic Games brought approximately 2,600 athletes from 82 nations to Vancouver/Whistler. Both the Olympic and Paralympic Games were organized by the Vancouver Organizing Committee (VANOC). The VANOC Medical goal was to deliver excellent medical and health care services for athletes and team officials, Olympic and Paralympic family and workforce. To facilitate this a Polyclinic was built within the athletes villages at Whistler and Vancouver. A Polyclinic is a multi-service medical center, which provides services in sports medicine, emergency care, imaging, physiotherapy, laboratory, pharmacy, and dentistry. In past Olympics, dentistry has been a well-utilized service and is usually one of the busiest medical services during the Olympic games. The goal for these games was to provide urgent dental care for athletes, which included examinations, radiographs, basic restorative dentistry, extractions, and endodontic treatment. In addition, there were several programs offered as part of the total dental service, including a dental screening program, oral cancer awareness program, oral health education, and a mouthguard program.

Sport-related orofacial traumatic injuries occur frequently among various kinds of sports activities. The Olympic Winter Games includes many sports that would be considered medium to high risk for traumatic dental injuries such as ice hockey, snowboarding, short track speed skating, aerial ski jumping, freestyle skiing, alpine skiing, luge, skeleton and bobsleigh. The dental literature supports the use of mouthguards in reducing sports-related injuries to the orofacial area. A recent meta-analysis (Knack 2007) indicated that the overall risk of orofacial injury is 1.6 - 1.9 times higher when a mouthguard is not worn, compared to wearing a mouthguard. The goal of the Olympic mouthguard program was to increase awareness of the importance of mouthguard use and provide custom-made pressure laminated mouthguards for the Olympic athletes.

The Olympic National Teams were informed prior to the Winter Games about the availability of dental services, including the mouthguard program. When athletes had dental visits, they were routinely asked, as part of their dental examination, which sport they participated in and if they currently used a mouthguard. If an athlete did not use a mouthguard, the benefits were explained, and in most cases, the athlete elected to have a mouthguard fabricated.

The process started with an excellent upper impression at the Polyclinic dental clinic, which was then sent to Space Maintainers Laboratories for the fabrication of a custom made pressure-laminated Sports-flex mouthguard. Each mouthguard was fabricated using 2 laminated layers of EVA, each 3 mm in thickness. This allowed for increased stability, better control of thickness, and less dimensional change. The goal was to provide a well fitting mouthguard that was comfortable, had minimal effect on breathing and speech, and was 3 – 4 mm in thickness for optimal protection.

The Sports-flex mouthguards were completed within 2 days and the athlete was seen for a final delivery where the mouthguard was tried in for comfort and retention. Minor adjustments were made chairside as needed. The occlusal surface of the mouthguard was gently heated with a flame and placed into the athlete's mouth. The athlete was then instructed to gently bite down normally and hold that position for 30 seconds. This step ensured a balanced occlusion. The mouthguard was rinsed with cold water and the occlusion checked again. Home care instructions were given to the athlete prior to dismissal, along with a case for storing the mouthguard.

In surveying many of the athletes after their dental visits, the athletes were very grateful for the mouthguard and commented routinely how comfortable the mouthguards felt. Overall, the mouthguard program was a huge success with the number of mouthguards fabricated exceeding that of any previous Olympic Winter Games. With the support and sponsorship of Space Maintainers Laboratories, the program successfully supplied 149 custom-made pressure laminated Sports-flex mouthguards for the various athletes during the Olympic Winter Games.

Dr. Parhar *completed his undergraduate degree in the Honors Biochemistry program at the University of British Columbia and went on to receive his Dental degree from the UBC Faculty of Dentistry in 1997. He is a member of the Academy of Sport Dentistry, International Association of Dental Traumatology, American Association of Endodontics, and Canadian Academy of Endodontics. Dr. Parhar has been the team dentist for the Vancouver Giants of the Western Hockey League since 2001 and has been actively involved in sports dentistry. In 2006, he was the Director of Dental Services for the World Junior Ice Hockey Championship and in 2007 he coordinated the dental coverage for the MasterCard Memorial Cup. He is currently a Resident in the Graduate Endodontic Specialty Program at the University of British Columbia. Dr. Parhar was the Co-Manager of Dental Services for VANOC Medical Services during the Vancouver 2010 Olympic Winter Games.*

The Olympic Winter Games includes many sports that would be considered medium to high risk for traumatic dental injuries such as ice hockey, snowboarding, short track speed skating, aerial ski jumping, freestyle skiing, alpine skiing, luge, skeleton and bobsleigh.

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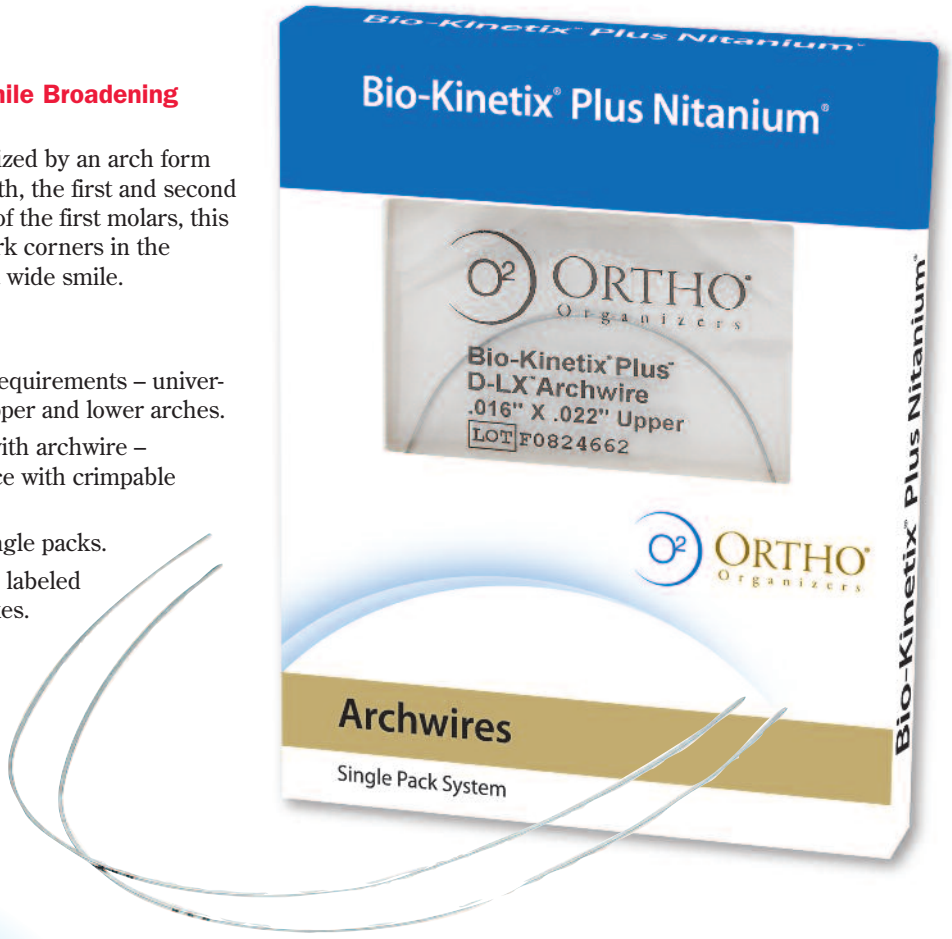
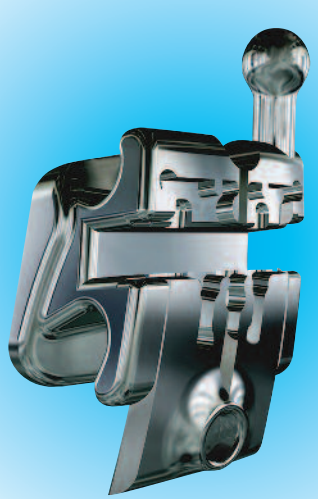
† *For hook and micro-stop options, please contact your local Cerum Ortho Organizers representative.*





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The Cadent iTero Digital Impression System

Implementing Digital Technology into the Practice

Trish Jones, RDH, BS
Key Accounts Manager, Aurum Ceramic @ LVI

Exciting, new dental technology is opening up new techniques and treatment modalities, making dentistry more simple, efficient, cost effective and kinder to the patient.

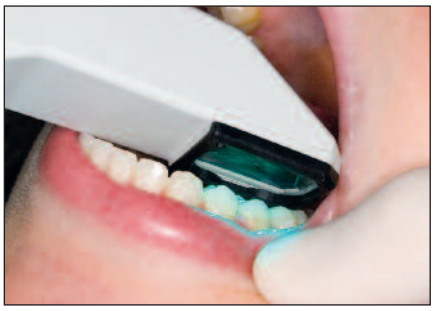
One area that has exploded involves digital impressions. Over the past few years, several systems have come on the market. As a laboratory committed to advancing the cause of Digital Dentistry, we support intraoral scanning systems in general, however, we feel the Cadent iTero Impression System is the current market leader.

What makes this system so special? And why would a laboratory be so interested? From our standpoint, if we can produce a crown with superior fit, contacts and occlusion, and reduce remakes, it is a win-win situation for all parties involved.

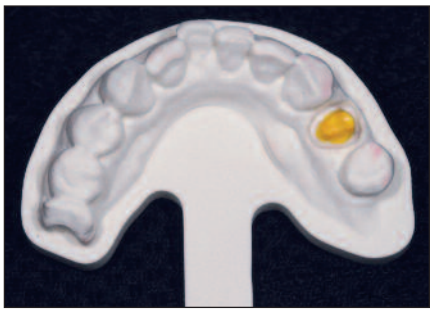
Let's recap what digital impressions are all about. The Cadent iTero allows the dentist to take electronic impressions intraorally. Once the digital impression is captured, the scans are sent electronically to Cadent where polyurethane models are fabricated and sent to the laboratory. Then the laboratory fabricates the requested dental restorations and returns the case back to the dental office. In some cases, if CAD/CAM technology is used, fabrication of the restorations can actually begin before models even arrive at the laboratory!

Here are a few key points covering what makes the Cadent iTero technology different and superior, in our opinion, to what is on the market:

- The iTero consists of a mobile cart that houses a computer, a 19 inch display monitor, a small air compressor and regulator, and a wireless foot pedal.
- The computer is set up for wireless connection, and has a wireless mouse and a built-in sealed keyboard so it is easily disinfected.
- The handheld scanner utilizes a disposable sleeve for each patient.



Cadent iTero wand in use intraorally.



A full arch can be scanned, whether it is a single or multiple units.

- The handheld scanner itself has air that flows through the scanner to prevent fogging while capturing images.
- While visually, the hand piece may appear large and cumbersome, it is easy to maneuver intraorally with experience and it can act as a cheek or tongue retractor at the same time. A bonus with this scanning device: you can touch the teeth for stability.
- It captures images using the "parallel confocal" technique. No other digital impression system on the market uses this technique. The iTero captures an image in focus in a 13.5 mm field of depth by using 100,000 points of laser light at 300 focal depths of tooth structure. So what does that really mean? It means NO POWDER! The iTero does not need to use powder to reflect the light back. The iTero scans in colour, so it is able to capture both supragingival and subgingival preparations. The true benefit is the scanner scans within 15 microns of what is in the patient's mouth. The milling deviation of the model is 2 microns. Therefore, it creates a near exact replica. There are little to no adjustments to restorations fabricated on an iTero model, and the fit is incredibly precise.
- Models are milled out by a 5 axis-milling machine from blocks of a proprietary polyurethane material. The great thing about the models is they do not break or shrink. The die model is also the solid model - so it eliminates the prior requirement for 2 models (one to check fit for margins on the die and one to check contacts on a solid). It is "two models in one".
- The Cadent iTero can be used for single units, smile designs, or full mouth reconstruction. Full arch models can be milled.
- There is no question that patients find scanning a lot more comfortable than traditional impression taking, plus they love that your office is truly state of the art.

If you are looking to invest in a piece of technology that is both affordable and has an outstanding return on investment, consider the Cadent iTero. It reduces chairtime, reduces remakes, speeds up turnaround time from the laboratory and can bring new patients into your office!

Here's one doctor's experience with Cadent iTero:

"The two dentists and four certified dental assistants in our office were trained on the Cadent Itero on March 17, 2010. Handling the scanner wand was awkward at first - but with persistence and perseverance both dentists and dental assistants are now routinely enjoying digital impression taking.

We have completed 50 units in 3 weeks and the results are excellent concerning marginal fit, proximal contact and the occlusion. We have had zero remakes and would recommend for everyone to 'go digital'."

Dr. Dana Bailey

"This patient was referred to my clinic for a major cosmetic and functional reconstruction of her smile. Her crown work had been completed 20 years ago. Today, the porcelain is broken, worn and discoloured. As a result, the patient was very uncomfortable and embarrassed by her smile. In addition, she was a heavy bruxer and suffered from a variety of neuromuscular problems as evidenced by a number of symptoms: pain in her neck, noise in her joints, dizziness and numbness at the tips of her fingers.

I did a complete analysis of her muscular activity with the K-7 and found there was a lot of muscular fatigue. At the tomogram, the patient showed significant artrosis in her right condyle. Her vertical dimension was also incorrect. I took a Myobite with the TENS and the K-7 and used it to develop a treatment plan to correct her occlusion and esthetics.

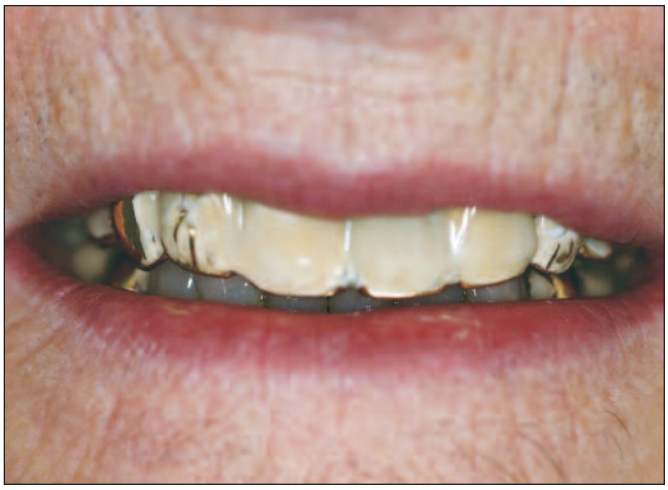
The Aurum Ceramic/Classic Implant Team fabricated fixed upper and lower orthotics correcting the esthetic and the bite. I then replaced the missing teeth (#'s 14-15-21-24-25-37-34-45-46) with 8 BioHorizon implants after completing bone augmentation throughout the mouth.

During the healing process, I saw the patient several times to adjust the occlusion on her orthotics with the TENS and the K-7. The objective was to eliminate her symptoms (neck pain, the numbness of her fingers and the noise in her joints) and stabilize the bite. These adjustments continued until she was free of symptoms and stable for at least 3 months.

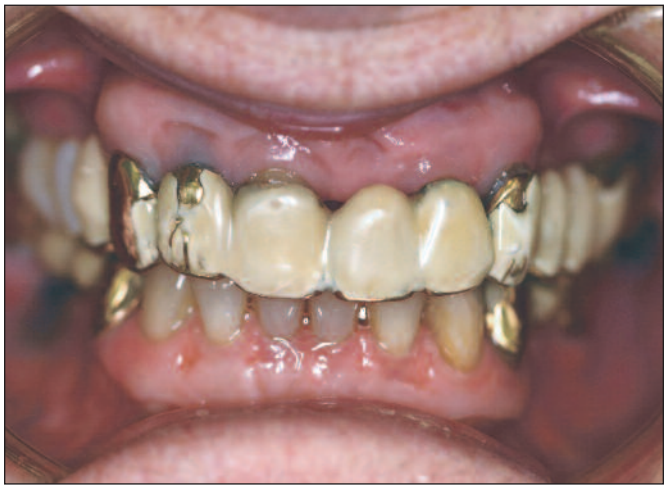
To complete the esthetic design of the final crowns, I used a computer program called "Dental GPS", deciding on the shape, width and length of the final crowns. The Aurum Ceramic/Classic Implant Team then used this virtual mock-up to create her new smile. In addition, this program allowed the patient to see what the final results would be. Aurum Ceramic/Classic used the exact measurements given on the GPS to fabricate the IPS Empress Esthetic crowns. The crowns were cemented in place. Micro adjustments of the occlusion with the TENS and the K-7 were made at that initial placement appointment and two other times at subsequent one month recall appointments. The patient is very comfortable and extremely pleased with the overall results.

The changes in her bite really improved the position of her head and released considerably the tension in her neck. She doesn't feel she bruxes any longer and is also very happy with the final esthetics.

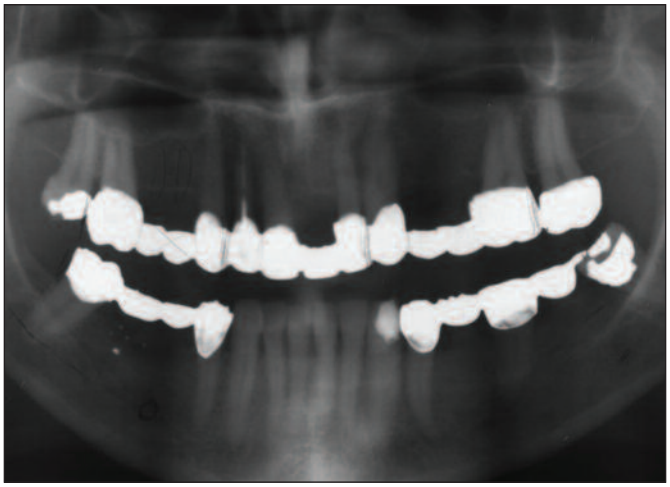
Full face before restoration.



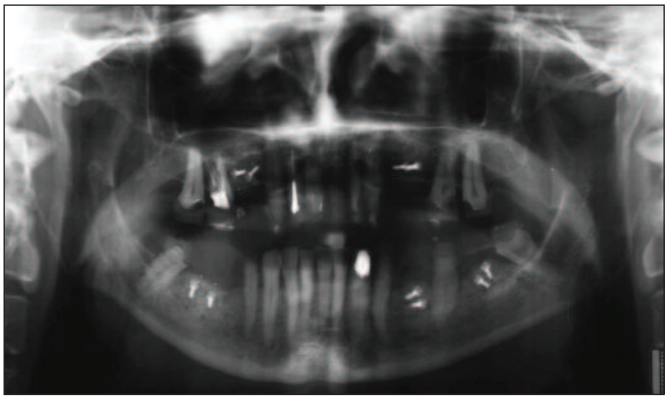
Close-up of pre-operative smile.



Retracted close-up of initial situation.



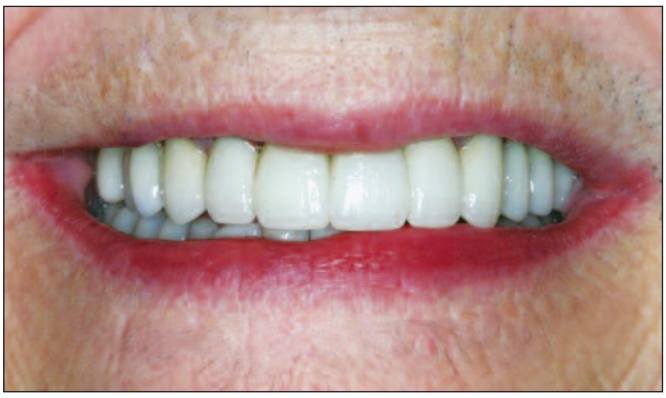
Panoramic view of the case before.



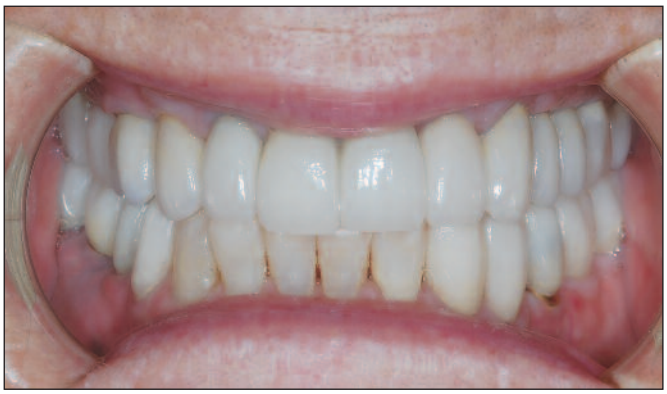
Panoramic view of the bone grafting with bone blocs technique.

Full face with the temporary crowns.

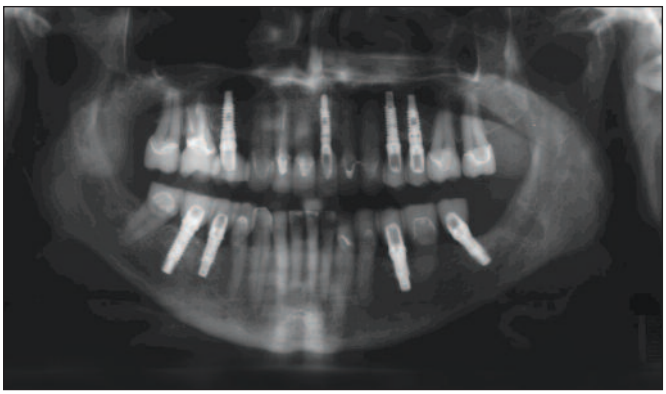
Full face with the final crowns.



Close-up of new smile.



Retracted After - Teeth together with new vertical dimension immediately after cementation.



Panoramic view of the final case with BioHorizon implants.

Restorations fabricated by Aurum Ceramic/Classic.

Dr. Nathalie Bouchard graduated from the University of Montreal in Dentistry in 1985. She completed a multidisciplinary residency from McGill University at the Jewish General Hospital in 1986. Her passion for surgery lead her to complete a full program in implant surgery, advanced bone grafting and prosthetics at the Canadian Implantology Institute and to become an ICOI Fellow. She attended many courses around the world in implantology with Dr. Carl Misch, Dr. Pat Allen, Dr. Vasos, Dr. Steigman in Germany and many others. She also became a neuromuscular dentist by completing the program at the Las Vegas Institute of Advanced Dental Studies. Dr. Bouchard has completed several courses at the Las Vegas Institute for Advanced Dental Studies (LVI) including Advanced Anterior and Occlusion I, Comprehensive Functional Aesthetics, Comprehensive Aesthetic Reconstruction, Full Mouth Reconstruction, Mastering Neuromuscular Occlusion, Neuromuscular Coronoplasty and Case Finishing, Advanced Interpretation and Diagnosis, and Core II Advance Adhesive Aesthetic Dentistry.

Dr. Bouchard is in private practice in Saint-Lambert, Quebec with a great emphasis on neuromuscular, cosmetic and implant dentistry. She is an active member of the ICOI, ACE, and other organizations.

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Treatment of Class II Division 1 Malocclusion Cases *(Part 2)*

Walt Pfitzinger, DDS, MS

In Part 1 of this two part series on the treatment of Class II Division 1 cases that show no lower arch crowding, I listed the diagnostic criteria that need to be met before considering the following scenario regarding treatment with functional appliances, in this case, the Bionator (For more information on the Bionator, please call your closest Space Maintainers Laboratories Canada location TOLL FREE). Please review these diagnostic criteria, as listed again in EXHIBIT 1, before starting any cases.

The case study is an 8 1/2 year old female who exhibits a full step Class II malocclusion with a 14 mm over jet and deep overbite (Figure 1 and 2). While the age of 8 1/2 may seem to be a bit early to start treatment, I felt that by reducing the amount of overjet early we would decrease the chance of accidental injury to the upper incisors. The initial appliance placed was a transverse screw appliance (Schwartz) designed to widen the maxilla and at the same time retract (tip back) the maxillary anterior teeth (Figure 3). The results of 5 months of wear with the appliance are shown in Figure 4. The patient has worn the appliance full time with weekly adjustments of the screw. Note that the maxilla has gone from a "V" shape to a rounded out arch form and in doing so, the overjet has been reduced to 9 mm. Figure 5a and 5b show the occlusion after the Schwartz appliance. Note in 5a that the lingual cusps of the maxillary posterior teeth occlude with the buccal cusps of the mandibular posterior teeth. However, when the patient shifts the mandible forward into a Class I relationship, the molars occlude in a normal cusp to fossa relationship.

The second appliance used in this patient was a Bionator designed to open the bite and position the mandible forward and is shown in Figure 6. The construction bite is taken with the mandible shifted forward so that when the appliance is worn the lower incisors are opposite the upper incisors. Channels are cut into the posterior acrylic to allow the posterior teeth to erupt, which has a net effect of opening the bite. This appliance is worn only in the evening (after dinner) and at night when sleeping. Physiologists report that most growth hormone is released during the first few hours of sleep making this the critical time for appliance wear.

Figures 7a and 7b show the results after 11 months of Bionator wear. The patient is in a Class I molar relationship and both overbite and overjet have been reduced. The photographs were taken at age 10 years 3 months. Note that the patient is still in the mixed dentition. At this point the Class II correction is completed. Although we always caution

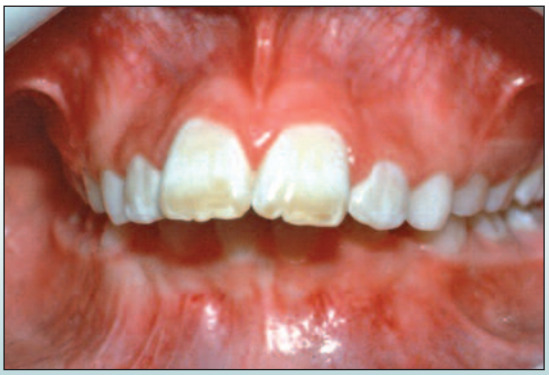

Figure 1- Pretreatment Age 8 1/2.

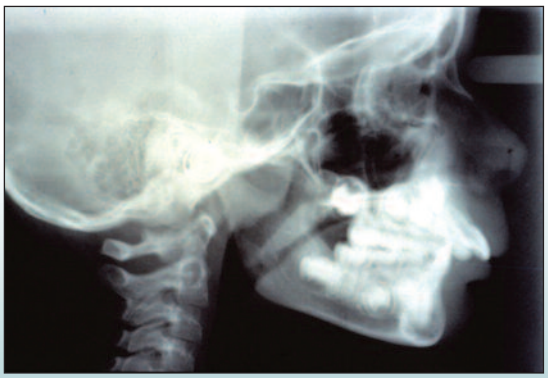

Figure 2 - Pretreatment Cephalometric x-ray Age 8 1/2.

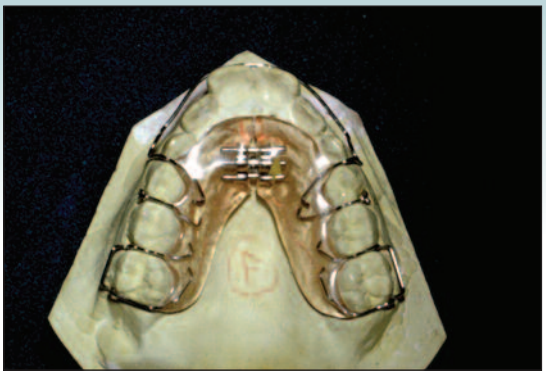

Figure 3 - Initial Transverse Appliance.

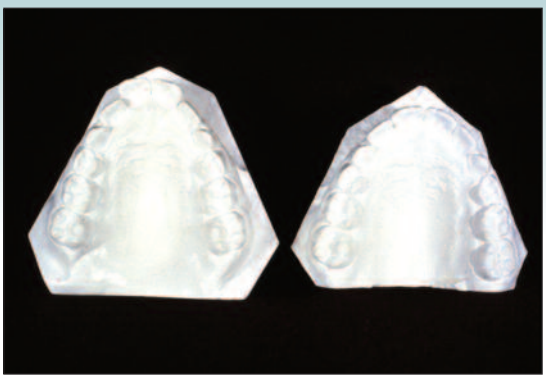

Figure 4 - Before and After Transverse Appliance.

Physiologists report that most growth hormone is released during the first few hours of sleep making this the critical time for appliance wear.

parents that the child will need fixed appliances when the permanent dentition is fully erupted, in this particular case the patient did not have any fixed treatment.

In summary, I have presented a case that responded well to removable appliances. My experience is that when care is taken to select the right cases for functional appliances, the results are excellent as long as patient cooperation is obtained. Not demanding full time wear with the functional appliance helps to insure that cooperation.

Figure 6 - Bionator Appliance.

EXHIBIT 1

Diagnostic Criteria

- Class II Division 1 cases with deep bites and a moderate to severe overjet.
- Cases that exhibit a retrognathic mandible as opposed to a prognathic maxilla.
- Cases that exhibit counterclockwise or horizontal growth.
- Cases that exhibit generally good arch form with no crowding in the mandibular arch.
- Patients that we believe will be cooperative (no day time wear is required).
- Cases that are actively growing (ideally treatment takes place during the pubertal growth spurt).

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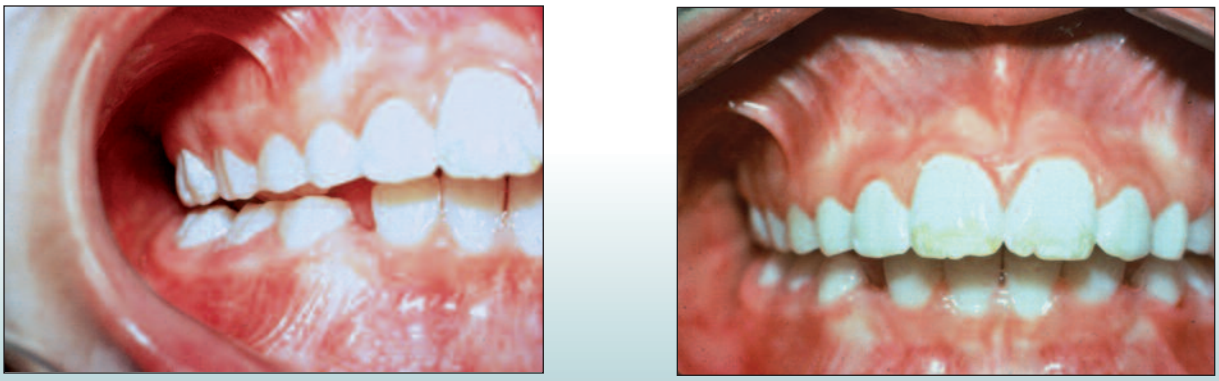

Figure 5a and 5b - Intraoral Photos After Transverse Appliance.

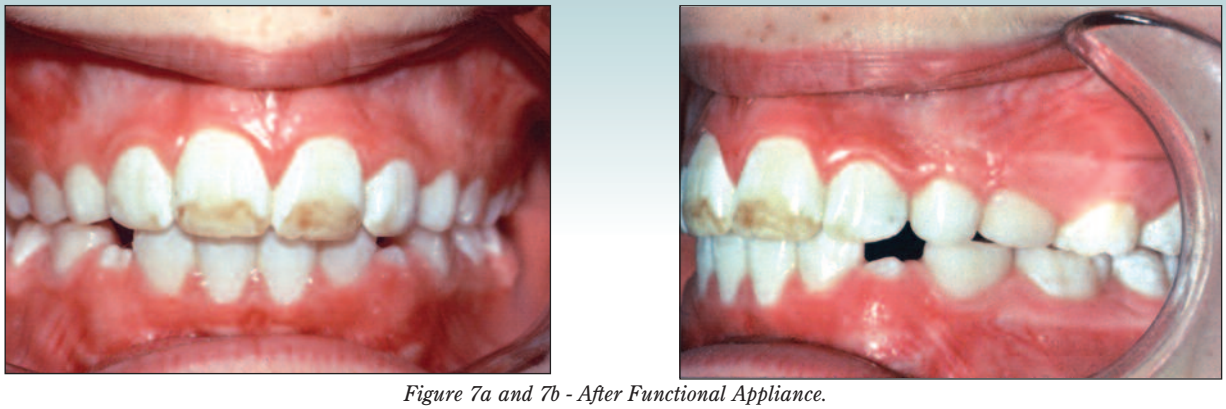

Figure 7a and 7b - After Functional Appliance.

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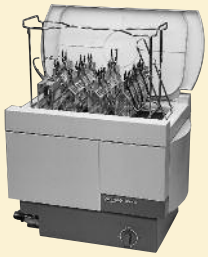
Protocol for Cleaning Orthodontic Pliers Prior to Sterilization

Dental Sterilizers do **not** run at temperatures high enough to damage Orthodontic Pliers. Rust and corrosion are actually caused by harmful minerals and chemicals that come into contact with these instruments. The heat generated by sterilization then accelerates the damage. Following these easy steps can help prolong the life of your valuable instruments and protect your investment:

Ultrasonically clean or hand scrub instruments in a biodegradable / no rinse solution

(Recommended product: *DMP-US Plus Ultrasonic Cleaning Solution;* a highly concentrated, no rinse formula that requires no distilled water and has a strong rust inhibitor). Do **not** use enzymatic cleaning solutions, as they will corrode your pliers.

- Add 1/2 fl.oz. (15 ml) of MPUS Plus per gallon of tap water.
- Change cleaning solution daily for best results.



Clean for five (5) minutes in a small capacity Ultrasonic Cleaner or twelve (12) minutes in a large capacity Ultrasonic Cleaner

(Recommended product: *DDUS60/DDUS60R).*

Let instruments drip dry or pat dry with a clean paper or shop towel.

Wipe mouth mirrors dry with a clean paper or shop towel to avoid spotting, or shake off excess moisture as they sit on racks.

- Do **not** rinse. Harmful minerals found in tap water can leave rust spots on your pliers.
- Use clean towels to dry instruments prior to sterilization.
- Detergent residue from towels can stain your instruments.

Lubricate hinged instruments weekly with a silicone lubricant

(Recommended products: *DSL16 Multi-Purpose Silicone Lubricant or DSY20 Syringe).*

- Lubricate between Ultrasonic Cleaning and Dry Heat Sterilization.
- Do **not** use oil-based lubricants as they are unable to withstand most sterilization temperatures and may "gum-up" in the hinges of your instruments as well as the sterilizer chamber.

Sterilize in a Dry Heat Sterilizer

(Recommended product: *DDS 7000*).*

- Do **not** use autoclaves (steam under pressure). Autoclaves will rust and dull orthodontic pliers.
- Do **not** use chemclaves (chemical under pressure) as they can dull orthodontic pliers.

Keep Your Sterilizer Clean

To keep your sterilizer in good working condition, follow these easy steps every other day:

- Spray 409®* or Fantastik®** on a paper towel or clean cloth and wipe down the inside and outside of the unit.
- For tough stains on inside of unit, use a teflon pad or stainless steel with 409®* or Fantastik®**.
- Please Note: All product recommendations are products available from Dentronix with the exception of 409®* and Fantastik®**. To maintain sterilizer performance we recommend annual servicing and proper maintenance.

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