You just get more with BruxZir®

Over 9 million restorations delivered through the Authorized BruxZir® Laboratory network

BruxZir®
Solid Zirconia Crowns & Bridges

The #1 prescribed brand of solid zirconia is available at dental laboratories nationwide.

Why not put BruxZir to the test today?
November 2010 is a milestone in dental history. That’s the first time that doctors prescribed more BruxZir restorations than PFM restorations. At the time, BruxZir Solid Zirconia was nearly two years old and PFMs were 50 years old. Here at the lab, it confirmed a trend that we had been observing during that time: The days of the PFM being the dentist’s everyday restoration were coming to a close. The sales of BruxZir never dipped below those of the PFM again; in fact, the gap between the two continues to grow wider as BruxZir grows and PFMs continue to shrink (see graph to right).

The rapid growth of BruxZir Solid Zirconia took us somewhat by surprise, as our original intention for the material was as a cast gold or metal occlusal PFM replacement. Almost every dentist I know agrees that cast gold is the finest indirect restorative material we have in dentistry. Unfortunately, almost every patient I know agrees that cast gold or a PFM with a metal occlusal is the least esthetic indirect restorative material we have in dentistry.

As the translucency and esthetics of BruxZir Solid Zirconia continue to improve, it has transitioned from being solely a posterior material to being an anterior material as well, meaning it can be used in almost any clinical situation. The biggest reasons for the rapid growth of BruxZir are high strength and fit. As a monolithic restoration with no porcelain on it, BruxZir Solid Zirconia has the lowest fracture rate of any restoration (besides cast gold) in our lab. It’s clear that dentists place strength very close to the top, if not at the top, of their list of desirable characteristics for an everyday crown & bridge material.

By far the most common comment we get from dentists about BruxZir restorations is how well they fit compared to most of the crowns they have used in the past. It took us a few months to figure out what these dentists really meant. It wasn’t that they used to cement crowns with open margins; it was that the emergence profile of BruxZir crowns blended with the tooth structure and soft tissue better than any material they had previously used (again, with the exception of cast gold). The microscopic images that follow demonstrate how a high-strength monolithic crown (BruxZir Solid Zirconia) has a much better emergence profile than a bilayered crown (PFM) on an identical prep.

The combination of fit, strength and improved esthetics has made BruxZir Solid Zirconia the most prescribed restoration in the lab, and it shows no signs of slowing down. Most recently, we have introduced BruxZir Anterior as the newest member of the BruxZir family. By increasing the amount of yttria in the zirconia oxide, we were able to create a material that competes esthetically with lithium disilicate, while still being 50 percent stronger than lithium disilicate. BruxZir Anterior means that solid zirconia can now be your restoration of choice in the anterior just like it is in the posterior.

Dr. Michael C. DiTolla
Before: This patient recently had an endodontic procedure through this lower molar PFM crown and recurrent decay on the distal of the bicuspid. The patient had never been particularly happy about the gray hue of the PFM, and he didn’t like having a hole in the top of the crown, even though it was patched with composite.

After: According to lab statistics, crowns on first molars fracture more than any other crown, so I chose a BruxZir Shaded crown for its combination of strength and esthetics. Nearly all of the more than 340 Authorized BruxZir Labs now exclusively use the BruxZir Shaded material.

Buccal After: While these BruxZir Shaded crowns won’t be mistaken for enamel when compared to the surrounding natural dentition, it does a very good job of blending in with these teeth. It doesn’t stick out like a PFM restoration. I consider solid zirconia to be the best blend of strength and esthetics for molar restorations.

Visit www.bruxzir.com for more information.
BruxZir Clinical Studies

BruxZir and e.maxCAD: Superior Clinical Performance at 3+ Years

Gordon’s Clinical Bottom Line: The TRAC research section of CR has been conducting a controlled clinical study of monolithic restorations for 3-1/2 years. These restorations are serving far better than anticipated. This report contains an update on the well-documented positive TRAC research results.

Scanning electron microscope (SEM), clinical, and laboratory examinations are showing equally excellent service for BruxZir and e.maxCAD milled full-contour crowns on molars at 41 months of service in a practice-based controlled clinical study. This service record exceeds that of over 100 other tooth-colored materials studied by TRAC over the past 39 years using the same methods. The superior performance of these two products has commanded our close attention. Literally millions of these two products have now been placed by U.S. dentists over the past five years—ramping dominance away from the time-honored PFM. Yet clinical research has lagged far behind clinical use, leaving important questions unanswered.

This report provides follow-up on the one-year data published in the June 2012 Clinicians Report to update clinicians as answers begin to develop to the following critical clinical questions.

Critical Clinical Questions and Answers Beginning to Develop after 3+ Years of Service

1. Does BruxZir zirconia severely wear opposing dentition?

NO, see chart below. Concern that zirconia would severely wear opposing dentition dictated our locating and measuring all facets on test crowns and all types of opposing dentition. Three-year data below show BruxZir zirconia crowns caused 23% less wear of opposing dentition than the pressed ceramic-over-zirconia Control (PressCrown by Swiss NP over zirconia by Metadent) and about the same wear as e.maxCAD lithium disilicate processed with an experimental 12.5-minute post-mill procedure. BruxZir received more wear than it caused.

Table 1: Percent area worn by the Test Crowns and the Opposing Dentition

<table>
<thead>
<tr>
<th>Brands names of materials studied</th>
<th>% area worn by Test Crowns</th>
<th>% area worn by Opposing Dentition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 1</td>
<td>Year 2</td>
</tr>
<tr>
<td>BruxZir</td>
<td>5.5</td>
<td>10.3</td>
</tr>
<tr>
<td>e.maxCAD (27 min post-mill processing)</td>
<td>6.7</td>
<td>10.8</td>
</tr>
<tr>
<td>e.maxCAD (12.5 min post-mill)</td>
<td>4.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Pressed ceramic-over-zirconia (Control)</td>
<td>10.9</td>
<td>14.2</td>
</tr>
</tbody>
</table>

* Data apply only to BruxZir zirconia. Other zirconia formulations may perform differently.

2. Does BruxZir zirconia lack of flexibility adversely affect the occlusal system?

Some people predicted tooth mobility, mastication muscle strain, and joint dysfunction. None of the predicted problems have been noted to date in this study. If you have experienced any of these problems with BruxZir, please contact by email rela@tracresearch.org.

3. Do full-zirconia dental restorations undergo phase change in the 100% humidity of the oral cavity?

To date, phase change problems such as surface cracking and microcracks have not been noted by SEM, nor have particles released into soft tissues with resulting inflammatory changes been seen in this study. However, more time is needed to eliminate this question. In 2001, some zirconia hip joint implants showed these changes occurring within months to beyond five years of clinical use. BruxZir was released commercially in summer 2009, so these are critical years regarding this question. Other more recently released dental zirconia will require similar long-term monitoring.

4. If e.max lithium disilicate is performing so well, why consider use of BruxZir full-zirconia?

There are no data to indicate BruxZir and e.maxCAD could not serve equally well in all single-unit situations. Empirically, both dentists and lab technicians have preferred to take advantage of e.max lithium disilicate’s beauty for anterior teeth and BruxZir’s high strength for the following:

- When minimal tooth preparation can be used.
- This study shows BruxZir meeting its claims by serving well with less than 1.0 mm occlusal reduction and near-feather edge margins on molars, even in patients with bruxing/claenching habits. e.maxCAD was not tested with minimal reduction preparations because these claims were not made for this product.
- In areas that force shallow preps due to limited space.
- For labs, anytime the preps are too shallow to allow predictable positive clinical results with other materials.
BruxZir Clinical Studies

BruxZir and e.maxCAD: Superior Clinical Performance at 3+ Years (continued from page 1)

4. If e.max lithium disilicate is performing so well, why consider use of BruxZir full-zirconia?

Table 2: BruxZir and e.maxCAD are the antithesis of one another in many characteristics.

<table>
<thead>
<tr>
<th>Differences</th>
<th>BruxZir</th>
<th>e.maxCAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Very high flexural strength (1000+ MPa)</td>
<td>- Lower flexural strength (about 550 MPa)</td>
<td></td>
</tr>
<tr>
<td>- Adaptable and improving esthetics</td>
<td>- Excellent esthetics</td>
<td></td>
</tr>
<tr>
<td>- Minimal prep permissible</td>
<td>- Deeply prep preferable</td>
<td></td>
</tr>
<tr>
<td>- Moderately worn by opposing dentition</td>
<td>- Moderately wears opposing dentition</td>
<td></td>
</tr>
<tr>
<td>- Very long post-mill processing (8.5 hours)</td>
<td>- Shorter post-mill processing (12.5 min)</td>
<td></td>
</tr>
<tr>
<td>- Mills smoothly at margins</td>
<td>- Milling causes many small chips at margins</td>
<td></td>
</tr>
<tr>
<td>- Cannot acid etch, can sandblast gently</td>
<td>- Acid etches well, must not sandblast</td>
<td></td>
</tr>
</tbody>
</table>

Similarities

- Both BruxZir and e.maxCAD are
- - Time consuming to remove, and removal risks
- - - Prep gouging
- - - Glaze degrades in occlusal contacts, but the
- - - - Wear mechanisms function well in occlusion
- - - Currently, more time consuming for lutes to
- - - - Polish than to Glaze

5. Should BruxZir and e.maxCAD be final polished or glazed?

After only six months, it was evident the glasses would not last long. By three years, 54% of the glass applied on occlusal surfaces in this study was no longer present (31% removed by dentist for occlusal adjustment and 23% removed by use). Glaze is used because it is faster than polishing, leaves surfaces very smooth, and preserves characterization stains. However, the clinical degradation and resulting gross surface roughness negates all these points. Options are to improve the glazes or develop easy polishing techniques and internal characterization of blocks.

Figure 1: SEM documentation of glaze degradation over time for either BruxZir or e.maxCAD

A. Very smooth surface finish on glaze initially.
B. Glaze loss and roughening after only 6 months of service.
C. Severe glaze roughening and loss exposing underlying material at 3 years.
D. Magnification shows glaze roughness compared to underlying smooth material.

Critical Clinical Questions and Answers Beginning to Develop after 3+ Years of Service (continued)

6. What are the best instruments for occlusal adjustment?

February 2013 Clinicians Report gave detailed analyses of 16 products, naming Laser (Meisinger) and OptimaFine (Lecta Vinodont) as CR Choices.

7. Is TRACs experimental 12.5-min. post-mill processing procedure for e.max the same, better, or worse than the original 27-min. procedure?

The two procedures were statistically the same in 18 variables monitored, but crowns treated using the experimental 12.5 minute method showed numerically less wear of opposing dentition.

8. Does entry access compromise BruxZir and e.maxCAD restorations?

YES. October 2012 Clinicians Report gave detailed information on best instruments and techniques, and concluded with the necessity to use new diamond, light pressure, and copious water coolant with 1.5mm or more of occlusal material thickness.

9. What are the best products and techniques for removal of BruxZir and e.maxCAD crowns?

New fine-grit, round-ended taper diamonds used with water coolant, light touch, and frequent examination to avoid gouging underlying dentin works best. Additionally, Poloris Crown Cutting Wheel (Pollard Dental Products) is preferred by some clinicians, but requires attention during use to avoid unintended cutting.

10. What is the best cementation technique for BruxZir and e.maxCAD?

See below and page 4. Steps and best products are different for zirconia vs. lithium disilicate.

11. Can zirconia have the translucency and colors available now with lithium disilicate?

Translucency and colors of zirconia are improving, but currently lithium disilicate is superior in these characteristics. However, BruxZir esthetics can be adequate (see Figure 2, 30 full-crown BruxZir case at right).

12. What is the expected service life and failure mode of BruxZir and e.maxCAD?

No one knows. The first and only chip in this study occurred on BruxZir at one year and has not progressed (see Figures 3 at right). More time is needed to answer this question. Current exceptional service justifies hope for exceptional longevity.

TRAC Conclusions:

BruxZir and e.maxCAD full-contour crowns on molars have demonstrated clinical service superior to all other tooth-colored materials studied clinically by TRAC over 39 years. To date, their service record resembles that of cast metal. Clinical service over three plus years has begun to answer many critical clinical questions, but important questions remain on: possibility of phase change of zirconia in 100% humidity of oral cavity; glaze use, service life, and failure mode. Status reports will be forthcoming as answers to these and other pertinent questions emerge through this study.
**BruxZir Solid Zirconia Crowns and Bridges**

**3-year Clinical Performance Report**

+ + + + +

**Glidewell Laboratories**

www.glidewelldental.com

**Description**

A total of 822 *BruxZir Solid Zirconia Crowns and Bridges* have been placed over the past four years. They included single crowns (87%) and three- and four-unit bridges (13%). The restorations were cemented with adhesive and self-adhesive resin cements.

**Purpose**

The purpose of this evaluation was to report the clinical performance of *BruxZir Solid Zirconia Crowns and Bridges* at three years.

**Clinical Evaluation Protocol**

At recall, 632 *BruxZir* restorations were evaluated, including crowns; three- and four-unit bridges; and implant-supported crowns and bridges (Figure 1). The majority (88%) of the restorations were fabricated by *Glidewell Laboratories*, while 12% were fabricated by Apex Dental Milling. Of the 632 recalled restorations, 33% were up to 3 years old, 46% were 3-4 years old and 21% were over 4 years old (Figure 2).

*BruxZir* restorations were evaluated in the following categories: esthetics, resistance to fracture or chipping, resistance to marginal discoloration, wear of zirconia and opposing dentition, and retention. The restorations were evaluated on a 1-5 rating scale: 1=poor, 2=fair, 3=good, 4=very good, 5=excellent.

**Consultants’ Comments**

“Beautiful Crown. Perfect fit and no adjustments.”

“One of the nicest implant crowns I have seen.”

“BruxZir is a great choice for worry-free crowns and a good value.”

“BruxZir is my go-to restoration for posterior teeth; it looks good and I know it will last.”

“I have been using *BruxZir* for four years or more and I have not been disappointed – neither have my patients.”

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**FIGURE 1**

Distribution of *BruxZir* Solid Zirconia Crowns and Bridges at Three-Year Recall.

- Crowns: 76%
- Bridges (3 and 4 units): 15%
- Implant-supported Crowns and Bridges: 9%

**FIGURE 2**

Age of *BruxZir* Solid Zirconia Crowns and Bridges at Three-Year Recall.

- Less than 3 years old: 46%
- 3 to 4 years old: 21%
- More than 4 years old: 33%
Clinical Observations

Esthetics
The esthetics of BruxZir was rated excellent (Figure 3) when one considers the consistency of the shade and compares the esthetics to other monolithic zirconia restorations. Other zirconia restorations are generally more opaque and lack opalescence. BruxZir restorations were not compared with esthetic ceramic restorations resulting from layered porcelain. BruxZir restorations are perfect for patients desiring more uniform and whiter teeth like a B1 shade. The new BruxZir 16 pre-shaded zirconia, recently introduced by Glidewell Laboratories could further improve esthetics.

Resistance to Fracture/Chipping
The chipping or fracture of BruxZir single crowns has been practically non-existent (Figure 3). One second molar crown did fracture, but it was likely due to lack of occlusal clearance and reduction. Having less than a 1 mm of clearance is not recommended for molars. None of the three- or four-unit bridges have fractured.

Resistance to Marginal Discoloration
None of the restorations exhibited any marginal discoloration at four years (Figure 3). The opacity of the crowns may help camouflage any staining or microleakage.

Wear Resistance
Almost no wear was observed on BruxZir restorations and very minimal wear was observed on opposing natural dentition at four years (Figure 3). More wear was noted on gold crowns opposing BruxZir restorations.

Retention
Twenty-seven out of the 822 BruxZir crowns debonded (3%) and required recementation over the evaluation period (Figure 3). This debonding rate is slightly higher (3% vs 2%) when compared to non-zirconia crowns that THE DENTAL ADVISOR has documented over time.

Conclusions
Over a three-year evaluation period, BruxZir Solid Zirconia Crowns and Bridges have proven to be excellent restorations with respect to esthetics and dependability. BruxZir Solid Zirconia Crowns and Bridges received a 97% clinical performance rating.
**BruxZir Scientific Validation**

**BruxZir translucency is unsurpassed in the warm color spectrum for more natural esthetics**

BruxZir Solid Zirconia exhibits higher translucency in the warm color spectral wavelength (>550 nanometers), allowing for more natural-looking restorations.

**BruxZir Restorations Deliver More Lifelike Results**

BruxZir Shaded zirconias allow for improved shade consistency, exhibiting a higher translucency when compared to other pre-shaded zirconias.

Note the differences in these photomicrographs of solid zirconia brands. The high-resolution photomicrographs capture cross-sectioned samples of BruxZir Solid Zirconia and two generic competitors. The visible white spots in the competitor samples reveal agglomerates that remain after the sintering process, which decrease translucency and flexural strength. BruxZir Solid Zirconia has a smaller grain size and is nearly free of agglomerates. Unique, patented colloidal zirconia processing gives BruxZir Solid Zirconia higher flexural strength and provides more natural-looking restorations.

**Scanning Electron Microscope Images**

SEM of sintered, colloidaly processed BruxZir Solid Zirconia vs. sintered, isostatically pressed zirconia
BruxZir Solid Zirconia crown & bridge restorations easily exceed the ISO 6872 flexural strength specification of 800 MPa for posterior ceramic bridges.

**BruxZir vs. Ceramco®3 — Comparative Wear Study**

BruxZir Solid Zirconia and Ceramco®3 were tested using a WILLYTEC chewing simulator in a comparative wear study led by Dr. Jürgen Geis-Gerstorfer, a professor at the University Hospital Tübingen in Germany.

After 1.2 million wear cycles under a load of 5 kg, BruxZir Solid Zirconia compared favorably to Ceramco3, with barely detectable wear. Example of the topography of Ceramco3 after wear test is shown above.

**Comparative Wear Study Results**

The antagonistic (Steatite balls) wear shows BruxZir Solid Zirconia only with 72±21 micron, which is significantly lower than Ceramco3, with 110±48 micron. To view the full study, visit www.bruxzir.com.

**BruxZir vs. IPS e.max® Enamel Wear Test**

In a recent study to measure the volumetric loss of enamel, glazed BruxZir Solid Zirconia was found to wear compatible with enamel and virtually identical to glazed IPS e.max. To view the full study, visit www.bruxzir.com.

IPS e.max is a registered trademark of Ivoclar Vivadent.
CASE 1

The crowns on tooth #6, #7 and #8 are BruxZir Anterior and the crowns on tooth #9, #10 and #11 are IPS e.max. Due to the increased translucency of BruxZir Anterior you can see that these solid zirconia crowns come much closer to matching the proven esthetics of IPS e.max.

These IPS e.max crowns were fabricated with IPS e.max MT (Medium Translucency) ingots. Because these crowns are less translucent than the IPS e.max HT (High Translucency) ingots, the tetracycline-stained preparations do not show through at all.

Both sets of restorations look more vital than the patient’s existing PFM crowns. These Captek™ crowns had been in place for 15 years, and while they served her well, she was not pleased with the visible margins and was happy to hear that there are now several more esthetic options available.

CASE 2

A patient presented with the chief complaint of wanting to replace the failing composite on one of their maxillary incisors. After noting the minimal wear and absence of parafunctional habits, caries were excavated, a preparation was made, and then a BruxZir Anterior crown was delivered.

A single-unit BruxZir Anterior crown was seated on tooth #9. Matching a shade in the esthetic zone has been a difficult task for dentists, and BruxZir Anterior has moved the bar ahead in terms of making that achievable with monolithic zirconia. We might be closer than most think to the day where monolithic zirconia crowns are the treatment of choice for restorations in the esthetic zone.

Captek is a trademark of Argen.
As you can see in this non-retracted “before” photo, the patient had two pre-existing, high-value PFM's over what appeared to be base metal copings on tooth #8 & #9. The condition of the gingiva suggested a possible base metal allergy, which contributed to my decision to go with BruxZir all-ceramic (solid zirconia) crowns.

DELIVERY OF THIS BRUXZIR SCREW-RETAIRED IMPLANT CROWN INVOLVED REMOVING THE CUSTOM HEALING ABUTMENT AND THEN SEATING THE ONE-PIECE CROWN. THE ABUTMENT SCREW WAS TIGHTENED TO 35 Ncm, AND A PERIAPICAL RADIOGRAPH TAKEN TO VERIFY FINAL SEATING.

ONCE THE INTERPROXIMAL AND OCCLUSAL CONTACTS HAD BEEN CHECKED, THE OCCLUSAL SCREW ACCESS OPENING WAS SEALED WITH A PIECE OF TEFON TAPE AND COMPOSITE, BRINGING THE BRUXZIR IMPLANT CASE TO A SUCCESSFUL CONCLUSION.

AS YOU CAN SEE IN THIS NON-RETRACTED “BEFORE” PHOTO, THE PATIENT HAD TWO PRE-EXISTING, HIGH-VALUE PFMS OVER WHAT APPEARED TO BE BASE METAL COPINGS ON TOOTH #8 & #9. THE CONDITION OF THE GINGIVA SUGGESTED A POSSIBLE BASE METAL ALLERGY, WHICH CONTRIBUTED TO MY DECISION TO GO WITH BRUXZIR ALL-CERAMIC (SOLID ZIRCONIA) CROWNS.
BruxZir® Solid Zirconia

is the #1 prescribed brand of solid zirconia, with more than 9 million restorations prescribed in 6 years.

Before

After

Patient’s left central was restored with BruxZir Solid Zirconia.