

# Resin-Reinforced Glass Ionomer Cements—Easier, Faster, and Better



**Michael C. DiTolla, DDS**  
 Director of Clinical Education  
 Glidewell Laboratories  
 Newport Beach, California  
 Phone: 800.854.7256  
 Fax: 949.440.2644  
 Email:  
 mditolla@glidewell-lab.com

During the past 10 years, resin-reinforced glass ionomer cements, such as GC Fuji PLUS™ (GC America, Inc.), have become the most popular cements for everyday crown and bridge use. GC Fuji PLUS™ is available in a unique encapsulated automix delivery system (Figure 1). As a result of the push button activation and 10-second trituration at a minimum of 3,500 cycles per second (cps), a consistent mix is achieved every time. Additionally, there is no hand mixing or cleanup required with this delivery method. If desired, GC Fuji PLUS™ is available in a traditional powder-liquid hand-mixed system too.

## INDICATIONS

GC Fuji PLUS™ is a resin-reinforced glass ionomer luting cement designed for final cementation of metal or porcelain-fused-to-metal restorations, including crowns, bridges, inlays, and onlays. Its indications are extended for final cementation of Procera® All-Ceram (Nobel Biocare USA, Inc.) crowns and bridges. It bonds chemically and mechanically to tooth structure and to all types of core material. Its simple placement technique

provides significantly higher bond strengths than conventional glass ionomer cements while maintaining the favorable characteristics of glass ionomers: fluoride release, low coefficient of thermal expansion, and biocompatibility with tooth structure and soft tissues.<sup>1</sup>

The premeasured no-mix capsules make GC Fuji PLUS™ easy to mix and use. Unlike conventional resin cements, GC Fuji PLUS™ requires no etching of tooth structure to achieve its high bond strengths. Simply remove the temporary, clean the preparation, mix, and cement. When increased retention is desired, optional GC Fuji PLUS™ Conditioner (GC America, Inc.) prepares the surface and seals the dentin tubules. Its mild etchant, citric acid, removes the smear layer and debris. Its ferric chloride component is a proved method of sealing tubules.<sup>2</sup>

GC Fuji PLUS™ possesses high strength, fracture toughness, and versatility by design. This cement combines the technology of conventional GC America Inc.'s glass ionomer cements with resin reinforcement to produce a resin-ionomer matrix. Strong physical properties and durability are the result of the chemical bonding reaction plus the micromechanical interlock of the resin.

## FEATURES AND BENEFITS

GC Fuji PLUS™ chemically

bonds to dentin, enamel, and cementum, providing sustained high fluoride release that can be recharged through the use of fluoride toothpastes, mouthwashes, and topical treatments.<sup>3</sup> In-vivo research has shown that this high release of fluoride into the tooth helps prevent recurrent decay,<sup>4</sup> and the rapid pH shift toward neutral can decrease sensitivity problems. Its coefficient of thermal expansion is very similar to dentin, so it expands and contracts just like tooth structure when exposed to heat and cold. This feature maintains the integrity of the bond, and in conjunction with high fluoride release, decreases the likelihood of microleakage and decay, assuring a long-lasting restoration.

GC Fuji PLUS™ is clinically insoluble, minimizing the possibility of washout (GC America, Inc., data on file). Its low film thickness and extremely hard set improve the integrity of margins, allow castings to seat more easily, and reduce the chance of high occlusion. Because GC Fuji PLUS™ bonds in a wet field, there is no need to be concerned with maintaining a necessary amount of moisture on the tooth surface in the isolated field. For those who require extra working time for multiple-unit restorations, multiple-abutment bridges, or long-span bridges, the capsules (or powder and liquid bottles) can be refrigerated up to 10 minutes before use.

## CLINICAL TECHNIQUE

Figure 2 shows the preoperative condition of a patient who will receive four Procera® crowns cemented with GC Fuji PLUS™. Figure 3 shows typical preparations for Procera® All-Ceram crowns. The temporaries were removed and the preparations were cleaned with pumice and rinsed. After finger activation and 10 seconds of trituration at 3,500 cps, the capsule is placed into the applicator, and the cement is loaded into the crowns (Figure 4). The crowns are seated into place, and the excess cement is allowed to remain so there is no possibility of an oxygen-inhibited layer forming at the margins (Figure 5). After approximately 45 seconds, the excess cement is tested with an explorer to see if it is set enough to remove en masse (Figure 6). As soon as the material is stiff enough to be moved by the explorer, it can be simply peeled away from the facial and lingual margins (Figure 7). Initial interproximal removal of cement is best accomplished with waxed dental floss that has had a knot placed in the middle of its length, allowing the floss to dislodge any extra pieces of cement (Figure 8). Super Floss® (Oral-B®) is then passed through the interproximal areas to ensure that all remaining pieces of cement have been removed (Figure 9). Figure 10 shows the final restorations immediately after cleanup of the cement.



Figure 1—GC Fuji PLUS™ is available in a unique encapsulated automix delivery system.



Figure 2—The preoperative condition of a patient who will receive four Procera® crowns cemented with GC Fuji PLUS™.



Figure 3—Typical preparations for Procera® All-Ceram crowns.



Figure 4—After finger activation and 10 seconds of trituration at 3,500 cps, the capsule is placed into the applicator, and the cement is loaded into the crowns.



Figure 5—The crowns are seated into place, and the excess cement is allowed to remain so there is no possibility of an oxygen-inhibited layer forming at the margins.



Figure 6—After approximately 45 seconds, the excess cement is tested with an explorer to see if it is set enough to remove en masse.



Figure 7—As soon as the material is stiff enough to be moved by the explorer, it can be simply peeled away from the facial and lingual margins.



Figure 8—Initial interproximal removal of cement is best accomplished with waxed dental floss that has had a knot placed in the middle of its length, allowing the floss to dislodge any extra pieces of cement.



Figure 9—Super Floss® is then passed through the interproximal areas to ensure that all remaining pieces of cement have been removed.



Figure 10—The final restorations immediately after cleanup of the cement.

These four units were placed and the excess cement removed in less than 10 minutes. Cementation using resin cement would have mandated additional time for bonding and excess resin cement removal.<sup>5</sup>

## CONCLUSION

The combination of this innovative no-mix delivery system, with all the benefits of a resin-reinforced glass ionomer, provides a benefit for dentists and patients alike. ○

## REFERENCES

1. Fuji plus capsule hybrid ionomer cemented. *The Dental Advisor*. 1998;15:12.
2. Smales RJ, Gale MS. Comparison of pulpal sensitivity between a conventional and two resin-modified glass ionomer luting cements. *Oper Dent*. 2002;27:442-446.
3. Komatsu H, Shimokobe H, Kawakami S, et al. Caries-preventive effect of glass ionomer sealant application. Study presents three-year results. *J Am Dent Assoc*. 1994;125:543-549.
4. Council on Dental Materials, Instruments, and Equipment. Restorative materials containing fluoride. *J Am Dent Assoc*. 1988;116:762-763.
5. Tyas MJ, Burrow MF. Clinical evaluation of a resin-modified glass ionomer adhesive system: results at five years. *Oper Dent*. 2002;27:438-441.