

### Make'em & Break'em: Fracture Strength of Crowns (5/03)

Comparison of the fracture strengths of metal-ceramic crowns and three ceromer crowns. Ku CW, Park SW, Yang HS. J Prosthet Dent 2002;88:170-175.

Several new systems have been introduced to fabricate esthetic, full-coverage anterior and posterior restorations. Among these are ceromer (i.e., ceramic-optimized polymer) products, that are purported to offer superb esthetics along with acceptable physical properties. The purpose of this study was to measure and compare the fracture strengths of three ceromer products to that of a traditional metal-ceramic. A resin maxillary central incisor analog was made and prepared with a 2-mm incisal reduction, 90-degree 1-mm shoulder, and 5-degree convergence angle. The die was then replicated in wax ten times, and from them ten metal dies were cast. Ten full-coverage crowns were



then fabricated of each of three ceromer products (Targis, Ivoclar Vivadent; Sculpture, Jeneric Pentron; Artglass, Heraeus Kulver), and ten metal-ceramic crowns were made using the standard process. After the die and intaglio surfaces of the restorations were air abraded, they were cemented with ProTec CEM (Ivoclar Vivadent). Fourteen hours later, the crowns were mounted in acrylic and loaded at a 130-degree angle to the die's long axis until fracture occurred. **Results found that the metal-ceramic crowns required a significantly greater force to fracture them compared to the three ceromer crown systems. No difference was found among the three ceromer products.**

**DIS Comment: New products for the indirect fabrication of crowns, inlays, onlays, and veneers have appeared over the last decade in an attempt to overcome some of the shortcomings associated with metal-ceramic restorations. Often called "ceromers," they consist of a combination of resin polymers and glass or ceramic particles. Compared to porcelain, they exhibit less shrinkage and are claimed to be more esthetic because they don't rely on a metal substructure. They can also be repaired more easily intraorally and exhibit wear that is similar to that of tooth structure. One of the limitations of the ceromers is that they may be less resistant to fracture because they lack a metal substructure. This study, in fact, confirmed this belief by showing that metal-ceramic crowns were more resistant to fracture than several popular ceromers. It is important to note, however, that the ceromer crowns were not adhesively bonded to the dies using a dentin bonding agent. This is important because bonding has been shown to increase the fracture strength of an all-ceramic product.<sup>1</sup> They were also cemented with a hybrid resin/glass-ionomer cement (ProTec CEM, a product no longer being marketed), rather than a resin cement. Using a resin cement might also have resulted in a higher fracture strength for the ceromer crowns. At any rate, the authors highlighted a critically important point: the fracture strengths of all the products tested in this study exceeded (by a factor of approximately two) normal occlusal loads that occur in the mouth.**

#### Reference

1. Mesaros AJ, Evans DB, Schwartz RS. Influence of a dentin bonding agent on the fracture load of Dicor. Am J Dent 1994;7:137-140.