COMMENTARY

Silorane-Based Composite: Depth of Cure, Surface Hardness, Degree of Conversion, and Cervical Microleakage in Class II Cavities

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Bob Dylan once wrote "The Times They Are A-Changin' "[1] and his prose can metaphorically describe dental scientific developments: the past decade has produced several advancements in dental research, technology, and materials. Dental restorative resin technology has been traditionally based largely on the Bis-GMA resin system that was introduced from the efforts of Dr. Bowen and others in the late 1950s and early 1960s.[2–4] Throughout these 40+ years, improvements have been made in the areas of restorative resin polymerization, filler content and size, enhancement of physical properties, esthetics, and methods in the attempt to reduce polymerization shrinkage.[5] This latter endeavor has evolved to almost become the "holy grail" for some dental manufacturers to produce a non- or lower-shrinkage resin composite restorative material.

This work by Dr. Kusgoz and colleagues evaluated selected physical properties and characteristics of a silorane-resin-based restorative material (Filtek Silorane, 3M/ESPE, St. Paul, MN, USA) that is touted to possess less polymerization shrinkage. The authors compared the silorane material against two methacrylate materials marketed by the same manufacturer (Filtek Supreme XT, Filtek P60). The evaluation included depth of cure, degree of conversion, hardness, and microleakage.

Under the conditions of this study, the silorane material's physical properties and characteristics were found to be in the same ballpark as the same manufacturer's methacrylate-based materials. This information is valuable as it shows that the newer silorane restorative resin has similar in vitro performance in the areas tested. However, this information should be considered in perspective as we await further in vitro studies detailing this newer material. For instance, a recent study has suggested that low polymerization shrinkage may not equate to lower polymerization stresses generated.[6] Furthermore, it must be reaffirmed that any new type of restorative system must be assessed by several long-term clinical trials before general acceptance can be considered.

A new class of restorative resin produces a philosophical question, which should not surprise colleagues who know my skeptical nature: that is, should we automatically assume that the methods we have used for validating and/or evaluating methacrylate-based resins apply equally to a new resin based on a different polymer backbone? The authors in this study take an important first step toward the answer. Infrared spectroscopy is considered the "gold standard" for polymerization determination. Instead of the usual methacrylate aromatic peak (~1,609 cm^{-1}) reference the silorane oxirane ring peaks (~882 cm^{-1}) are used for the comparison reference. The authors also evaluated surface hardness. If per chance, these researchers would have evaluated top and bottom surface hardness of standard samples, the bottom/top hardness ratio would have provided feedback if the hardness ratio used in methacrylate resin evaluations[7,8] apply to silorane systems as well. Admittedly, there may be no difference and it all may correlate well. However, we will not know until we look.

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