COMMENTARY

CLINICALLY RELEVANT ISSUES RELATED TO PREHEATING COMPOSITES

Ronald L. Sakaguchi, DDS, MS, PhD*

Placement of high-quality resin composites requires the knowledge of the materials science aspects of the restorative material, as well as mastery of its manipulation. The art and science of resin composites is much more complex than for other restorative materials, such as amalgam. When one variable is changed, a cascade of altered dependent factors might result. Ideally, as we attempt to improve the physical and mechanical properties of a material, we hope that the associated properties will improve synergistically; however, we often find properties to change in unpredicted ways, resulting in an undesirable outcome.

Daronch, Rueggeberg, and colleagues elegantly describe the science of changing the temperature of composite compules before placement. They also provide useful clinical guidelines for chilling and warming composite restorative materials. They debunk some myths about the effect of temperature on the properties of composites while emphasizing the importance of being aware of the synergistic and antagonistic processes.

Resin composites do not change temperature readily because of the high content of thermal-insulating inorganic fillers. In an effort to increase the viscosity of a composite to provide greater packing resistance, one might choose to chill the composite. However, the authors point out that it takes 11 minutes for a composite to reach room temperature after removal from the refrigerator. If the composite is cured prior to reaching room temperature, the degree of conversion will be reduced, resulting in a restoration with potentially lower mechanical properties and greater chance for leaching unreacted monomer.

On the other hand, many clinicians prefer to reduce the viscosity of composites to improve flow and adaptation to cavity walls. This can be done by heating the composite in a warmer, as described by the authors. Clinicians should be aware, however, that the composite cools rapidly after removal from the warmer. Fortunately, as shown by the authors, composites do not appear to degrade when cycled from room temperature to the elevated temperatures in the conditioning unit.

This article emphasizes the significance of in vitro studies and the importance of understanding the science associated with the manipulation of resin composite materials. The physical and mechanical properties of materials are intertwined. One cannot be changed without affecting the others. This article is an excellent example of the role of materials science in a clinician's daily routine.

*Associate dean for technology and innovation, professor of biomaterials and biomechanics, School of Dentistry, Oregon Health and Science University, Campus Drive, Portland, OR, USA