I See the Light (5/03)

Light-emitting diode curing: Influence on selected properties of resin composites. Asmussen E, Peutzfeldt A. Quintessence Int 2002;34:71-75.

A number of manufacturers have recently introduced curing lights for resin composites that use light-emitting diodes (LEDs) instead of a halogen bulb for light production. Since the units have only recently come to the market, little research has been done to evaluate their efficacy at curing resin composites. To accomplish this, this study was designed to measured several properties of various resin composites cured using either a halogen bulb curing light or one of two LED units. Specimens were made of three resin composites (Z250, 3M ESPE; Pertac II, 3M ESPE; Definite, Degussa) using three curing lights (the halogen unit XL3000, 3M ESPE; the LED unit Elipar Freelight, 3M ESPE; the LED unit e-Light, GC America). Specimens were made in accordance with pertinent standards of the International Organization for Standardization (ISO), and the following properties were measured: flexure strength and modulus, depth of cure, degree of conversion (i.e., polymerization), and polymerization contraction. Statistical analysis revealed that the depth of cure of the three composites was significantly less with the LED units than with the halogen unit. The LED units also caused less and slower contraction of the resins than did the halogen unit. The LED lights produced a lesser degree of conversion, although the differences were not always statistically significant. Finally, for flexural strength, the e-Light appeared the least effective, while both LED units caused lower flexural modulus values for two of the three composites. **The authors concluded that the tested LED units provided the resin composites with physical properties that were the same or inferior to those produced with the halogen light unit. They also found the e-Light less effective than the Elipar Freelight.**

DIS Comment: Because LED units (compared to halogen bulb units) emit a narrower spectral range of light that corresponds well to the absorption spectrum of the most commonly used photoactivator in resins (camphoroquinone), the units offer several advantages. First, since they require less power to operate, they can be powered by rechargeable batteries, which eliminates the need for an electrical power connection. This, in turn, adds great portability to LED units. Also, they generate less heat so there should be less of a chance that thermal damage will be done to adjacent tissues. Producing less heat also means that they do not require cooling fans, which makes them quieter than halogen units. Unfortunately, a number of LED units are now commercially available with little published research to attest to their efficacy in curing resin composites. This study found that the two LED units tested produced the same or moderately inferior properties in resins than those produced by the halogen bulb unit. The two tested units, the Elipar Freelight and the e-Light, are second-generation LED units. The first generation units, a number of which have been evaluated by DIS, performed less effectively. Before purchasing LED units, which are usually more expensive than halogen units, it is probably prudent to wait until additional studies have been done to assess their performance.