

## Is your study reproducible? What “light” are you delivering to your specimens?

The use of resin-based composites, both clinically and for laboratory studies, continues to increase. As is well known, the quantity (radiant exposure in  $J/cm^2$ ) and characteristics (wavelength in  $mW/nm$  and beam profile) of light delivered to a photocured resin will have a significant impact on its polymerization. The nature of light emitting diodes (LEDs) means that, unlike halogen (QTH) light sources, they can only produce a narrow emission spectrum. Thus, not all LED light-curing units (LCUs) deliver the same wavelengths of light and, in order to produce a broad spectrum of light, LED LCUs must contain multiple LEDs. Depending on the optical design of the LCU, both the emission spectrum and the radiant emittance may be non-uniformly distributed across the light tip of the LCU. Furthermore, the irradiance and the beam profile of the light received by the resin will change as the distance from the light tip to the composite surface increases.

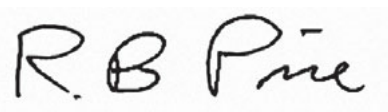
If we wish for research that requires the photocuring of dental resins to be both replicable and reproducible, the quantity (radiant exposure in  $J/cm^2$ ) and characteristics (wavelength in  $mW/nm$ ) of light delivered to the resin specimen should be reported. With this in mind, I examined contemporary articles published between January 2017 and July 2018 in the *Journal of Adhesive Dentistry* and found 53 that dealt with the photocuring of dental resins. In these 53 articles, the LCU brand used in the study was not always stated; the tip irradiance from the curing light was reported in about half of the papers, while mention of how it was measured was not always made. Unfortunately, when an irradiance value was reported, the value was not what was received by the specimen, but was instead the radiant exitance (tip irradiance) from the LCU. Although the radiant exitance value is the same as the irradiance at 0 mm distance from the light tip, this may not be what is actually delivered to the specimen. Consequently, the reader is left guessing what light the specimen received unless the distance between the light tip and the specimen is reported to

be zero. Similar descriptions have been observed in other journals where the authors have failed to report what the specimen received. This observation may explain why the results of many studies cannot be replicated.

Now that researchers have the ability to readily characterize the light received,<sup>1,2</sup> some articles have already started to report the light received by the specimen. I suggest that future articles published in the *Journal of Adhesive Dentistry* should report: (1) the identity of the LCU used; (2) the radiant exposure that is received by the specimen ( $J/cm^2$ ); (3) the emission spectrum; and (4), where critical to the study, the beam profile received by the specimen from the LCU. With this information, others will be in a better position to reproduce studies and hopefully replicate the results.

### REFERENCES

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2. Price RB, Ferracane JL, Shortall AC. Light-curing units: a review of what we need to know. *J Dent Res* 2015;94:1179-1186.



Professor Richard B. Price  
Department of Clinical Dental Sciences,  
Faculty of Dentistry, Dalhousie University, 5981 University Avenue,  
Halifax, N.S. B3H 4R2, Canada. e-mail: rbprice@dal.ca