

Improving the use of dental curing lights in both universities and the dental office

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The clinical success of light cured adhesive composite resin restorations is based upon attention to detail in each of the steps required to diagnose, prepare and restore. While much attention has been given to the details of diagnosis, preparation and the development of improved adhesives and resins, light curing is often taken for granted. Although it is well known that the restorative resins require a specific amount and type of energy to polymerize and reach their manufacturers' stated properties, every research publication has shown that many curing lights in dental offices do not work properly. Furthermore, even when the lights are working properly, poor operator technique often results in the resin receiving an inadequate amount of energy to meet the manufacturers specifications. This may help to explain why the NIH and other publications have identified that posterior resin composites placed in the dental office last an average of ~6 years, as compared to 15+ years for silver amalgam restorations or resin restorations placed in controlled conditions.

This presentation will review curing light measurement systems and introduce evidence that it is the amount of energy the curing light actually delivers to a restoration that is important and not the irradiance (light output) measured at the light tip. Until now we have had no idea how much energy resin restoration typically receive in the mouth and were thus unable to manage the problem. The presentation will describe how MARC™-Patient Simulator (Managing Accurate Resin Curing) was developed by Dr. Richard Price at Dalhousie University in Halifax, Canada to facilitate optimal light-curing of restorations. MARC™ is a laboratory-grade, clinically relevant, light-curing energy measurement tool with sensors to measure the light energy delivered to simulated restorations in a typodont head and jaws. The irradiance delivered to these simulated restorations is collected and displayed in real-time by a chairside computer. Thus MARC™ can be used to train dental and dental hygiene students, dentists, dental hygienists and assistants with the device and provide immediate feedback how to improve one's light-curing skills. (Now that we know how much energy is delivered, we can start to manage the problem of inadequate energy delivery.) The dangers of arbitrarily increasing curing times and thus causing possible temperature increases can also be demonstrated.

The presentation will describe how MARC™ can be used to effectively manage the four CORE variables that affect energy delivery in the mouth and better train clinicians:

1. **Curing light**
2. **Operator technique**
3. **Restoration characteristics**
4. **Energy requirement of the resin**

Recent publications on how MARC™ is used to train of dental students and dentists will be presented. At the conclusion of the presentation, participants will have the opportunity to use MARC™ to measure how much energy and what type of energy they are delivering in a simulated clinical environment. Participants will experience the potential of MARC™ as a powerful teaching and research tool.

Here are links to Articles on MARC and light curing:

<http://www.jcda.ca/article/a23>
<http://www.jcda.ca/article/a94>

<http://www.jcda.ca/article/b9>

<http://onlinelibrary.wiley.com/doi/10.1111/j.1708-8240.2010.00368.x/abstract>

<http://onlinelibrary.wiley.com/doi/10.1111/j.1708-8240.2010.00318.x/abstract>

Commentary

<http://onlinelibrary.wiley.com/doi/10.1111/j.1708-8240.2010.00319.x/abstract>

<http://onlinelibrary.wiley.com/doi/10.1111/j.1708-8240.2010.00369.x/abstract>