Light Curing Basics and Recommendations for Eye Safety

The placement of amalgam restorations is on the decline and the placement of resin-based composite restorations is on the rise. Dentists are continually striving to achieve clinically excellent results with composite resin restorations and manufacturers are constantly innovating new materials that offer more beauty and longevity. One constant in the placement of resin-based composite restorations is the utilization of a visible light to cure resin-based composites, sealants and cements.

A recent study surveyed Norwegian dentists to evaluate their knowledge regarding the practical use and safety of curing lights. This survey concluded that there was significant variation among dentists; most of the respondents of the survey did not understand the irradiance value of their curing lights and nearly 1/3 of the respondents do not use adequate eye protection from the blue light. A lack of understanding of the technical features of a curing light may lead to an incomplete cure of the composite (thus, a reduced life expectancy of the restoration) or over-exposure of heat to the tooth. Additionally, the inappropriate use of safety eyewear during the placement of the composite may result in ocular damage if the eye is repeatedly exposed to the blue light. Some clinicians will position the light over a tooth and then look away from the light during the curing process. This may result in an incomplete cure of composite if the tip of the curing light drifts from the tooth being restored. The purpose of this article is to describe what clinicians need to know about the proper use and technical aspects of curing lights and some practical recommendations to promote eye safety.

Curing Lights 101

The irradiance value of a curing light is related to the amount of energy that is emitted from the tip. It is common for the light output of a curing light to be classified using a single value, however that single value generally represents an average irradiance value. The irradiance value may have a significant range within a tip of a single curing light; where areas exist that offer minimal light output and other areas offering “hot spots” that have high amount of light output and significant heat. Moreover, some irradiance values are highest immediately adjacent to the tip of the curing light, but have a dramatic reduction of irradiance values as distances increase.

Understanding the irradiance value and the impact of distance on the irradiance value of your curing light will help you to identify the energy output and the proper clinical procedures associated with your curing light. Curing lights that do not have homogeneity within the tip of the curing light should be moved over the uncured resin during the curing process. This will encourage a complete cure of the resin, as opposed to an incomplete cure in some areas and potentially overheating others. Additionally, ensuring that curing takes place at the ideal distance from the tip of the curing light will encourage a
complete cure of composite, especially in areas that are inherently farther from the occlusal plane (eg. proximal boxes).

All curing lights do not offer the same spectral emission and all resin-based composite restorations require a specific wavelength of light to ensure a complete cure. It is vital for a clinician to ensure that the spectral emission of a curing light matches the requirements for the resin-based composite system that is being used. Some curing lights offer a broad range of spectral emission and will cure a wide variety of resin-based composite restorative materials, while others offer a smaller range and will not cure all resin-based restorative materials. It is essential for a clinician to know the requirements of all resin-based restorative materials and to ensure that the curing light is compatible.

**Potential Ocular Risks**

The risk of damage to the eye is the most significant risk to dental professionals when using a curing light. Ocular injuries can occur as a result of direct, accidental exposure or as cumulative effects of exposure to scattered light without proper eye protection⁴.

When exposed to visible light, the retina is particularly susceptible to damage. The retina is at risk for burning, accelerated retinal aging and macular degeneration⁵. In addition, the cornea is at risk for injuries or photokeratitis and may be responsible for the development of cataracts or lens opacification⁶. To mitigate these risks, it is the responsibility of the dental practice to protect the dental personnel and patients from exposure to visible light.

**Safety Recommendations**

Palmero Healthcare offers a complete line of safety eyewear protection, including safety glasses, face shields and eyewear to prevent injuries associated with light curing units and laser dentistry. They offer a Bonding Lens Shield that can be adapted to a curing light to shield the operator from the harmful light produced during curing.

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<th>PROVISION™ Bonding Safety Eyewear</th>
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If you prefer to wear safety glasses with orange-red lenses that will protect the eyes when curing resin-based restorative materials, Palmero Healthcare has a line of safety eyewear called ProVision™ BONDING Safety Eyewear. There are a variety of frames available to accommodate a variety of face shapes and style preferences and also offer wrap-around protection for side shielding. These glasses will require disinfection between procedures as well as for each patient if they are used as patient safety eyewear.

For more information visit: [https://www.palmerohealth.com/collections/bonding](https://www.palmerohealth.com/collections/bonding)
Palmero Healthcare also offers the versatility of utilizing orange protective lenses within their Dynamic Disposables BONDING Safety Eyewear line of products. These lenses can be used with the traditional Dynamic Disposables Frames and offer light protection, full coverage eye protection, including side impact protection.


Summary

One cannot be too safe when it comes to protecting yourself, your team and your patients from the harmful effects of visible light from light curing units. Utilizing safety eyewear can allow the clinician to safely visualize the working field while curing resin-based restorative materials. It is also essential for clinicians to understand the curing lights that are utilized within the dental practice, including the irradiance value, spectral emission and manufacturer recommendations for proper use.

Author

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Dr. Maragliano-Muniz is a board-eligible prosthodontist and earned her certificate from the UCLA School of Dentistry after obtaining her D.M.D. from Tufts University School of Dental Medicine. She is also a former dental hygienist: she earned her B.S.D.H. degree from Northeastern University and the Forsyth School for Dental Hygienists, A.A.S. in Dental Hygiene and A.S. degree in Math and Science from SUNY Orange in New York.

Since being awarded the 2010 Adult Preventive Care Practice of the Year by the American Dental Association, Dr. Maragliano-Muniz is an internationally recognized lecturer and is extensively published. She has also been recognized as Incisal Edge Magazine’s Top 40 Under 40 in 2016. In 2017, she was awarded the Edward A. Diana alumni award for Leadership in Healthcare from SUNY Orange, Boston Magazine’s Top Dentists and Dental Product Report’s Top 25 women in Dentistry.

Dr. Maragliano-Muniz is on the Editorial board for DentistryIQ.com’s Product Navigator Newsletter. She teaches at Tufts University School of Dental Medicine and maintains her private practice at Salem Dental Arts in Salem, MA.

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On a personal note, Dr. Maragliano-Muniz enjoys travel, outdoor activities and spending time with her family and pets.

References: