COMMENTARY

The Effectiveness of Low-Intensity Red Laser for Activating a Bleaching Gel and Its Effect in Temperature of the Bleaching Gel and the Dental Pulp

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Light-activated tooth whitening was, in some ways, a by-product of the high demand for "up-to-date" dental offices by patients and clinicians alike. Patients seemed to correlate new gadgets with high technology and superior dental care so dentists sought equipment in order to expand their armamentarium and list of services. Manufacturers responded to the demand by flooding the industry with various light-activated devices such as plasma arc, light-emitting diodes, argon lasers, and metal halide and xenon-halogen lights. These tools often came with claims of superiority without evidence to prove their efficacy or their usefulness. This paper highlights yet another light in our ever-growing list of whitening devices. The authors employ an appliance with three red light-emitting laser diodes.

In order to gain treatment time, clinicians have attempted to accelerate the degradation of H_20_2 by using light or heat. In 2002 and 2003, controversial papers were published evaluating the efficacy of light-activated bleaching agents. In one article, positive results using light-activated system were reported, while other articles concluded the opposite findings.

The assumption behind the use of lasers, light, or heat is that clinically tolerable levels of heat will speed the breakdown of H_2O_2 tooth-bleaching chemicals, and this accelerated H_2O_2 breakdown will cause teeth to lighten more rapidly per unit time. There have been studies measuring the decomposition of hydrogen peroxide by the amount of oxygen released. The data from these studies indicated that heat-accelerated decomposition of the 35% H_2O_2 was minimal when compared to the decomposition of the control gel. This JERD paper attempts to use low-intensity laser therapy (LILT) to activate the 35% hydrogen peroxide-based gel. The idea of using a green dye in the peroxide gel to increase light absorption is not novel. It has been attempted in the past using halogen lights with limited efficacy.

Some in vitro studies have shown the use of intense lights does elevate the temperature of the bleaching material with or without dye, and as a result, causes an increase in intrapulpal temperature. This could have an impact on post-bleaching tooth sensitivity and pulpal health. To our surprise, my team published a paper demonstrating the use of the Zoom light (Discus Dental, Culver City, CA, USA) had limited effect on the pulpal temperature of extracted human teeth. It is encouraging the LILT did not produce a significant increase in either gel or pulpal temperatures.

There are other major limitations to this study. First, it was done on extracted bovine teeth rather than human teeth. It also uses artificially stained tooth specimens using coffee, an ingredient commonly found to promote extrinsic stains. This chromophore is likely to be different than that found naturally inside the human tooth.

The use of the Easyshade (Vita, Bad Säckingeni, Germany) for color evaluation is acceptable and the fact that it was calibrated before being used for each group is encouraging. It would have been more informative if the authors presented the actual *L*a*b** values along with the delta E. By reviewing the individual scores it would allow the reader to confirm the *L* and *b*-values showed the directional changes one would expect in a whitening study.

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This commentary is accompanied by article, "The Effectiveness of Low-Intensity Red Laser for Activating a Bleaching Gel and Its Effect in Temperature of the Bleaching Gel and the Dental Pulp" Patrícia Rondon Pleffken, DDS, Alessandra Bühler Borges, DDS, PhD, Sérgio Eduardo de Paiva Gonçalves, DDS, PhD, Carlos Rocha Gomes Torres, DDS, PhD, DOI 10.1111/j.1708-8240.2011.00444.x.

It would have been a stronger paper had the researchers done 1 week and 1 month color measurements. We have demonstrated in a number of clinical papers that light-activated tooth whitening results in a slight benefit at 1 week but usually not again at 1 month.

I feel the authors are taking a "leap of faith" in some of their assertions. Specifically, there seems to be a lack of concrete evidence that LILT may have the added benefit of decreased sensitivity due to its effect on the synthesis, release, and metabolism of a wide range of neurochemicals, including serotonin and acetylcholine at the central level, and histamine and prostaglandins at the peripheral level. This conclusion requires a well-controlled clinical study.

Light- and laser-activated chairside bleaching systems are believed by many to offer the benefits of being less time-consuming while producing better results. The use of light-activated bleaching systems to accelerate the bleaching process is still in question, and given the results of this study, the LILT data must be confirmed by in vivo data.

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