

Open camera or QR reader and
scan code to access this article
and other resources online.



Comparing the Use of Diode Lasers to Light-Emitting Diode Phototherapy in Oral Soft and Hard Tissue Procedures: A Literature Review

Agata Lesniewski, DDS, Nathan Estrin, DDS, MS, and Georgios E. Romanos, DDS, PhD, Prof Dr med dent

Abstract

Objective: In dentistry, patient and physician adoption of diode lasers and light-emitting diodes (LEDs) continues to increase as research indicates that diode lasers and LEDs may be used for surgical and nonsurgical procedures. The goal of this literature review was to critically analyze randomized controlled trials and experimental trials to provide evidence-based recommendations on the therapeutic uses of diode lasers and LEDs in oral applications based on published efficacy and safety data.

Methods: A literature review was performed of published literature on patients receiving periodontal and oral surgery treatment that included the use of diode lasers and/or the use of LED phototherapy to determine if the outcomes of phototherapy were superior to conventional therapy and if one form of phototherapy was superior to the other.

Results: Eighteen original clinical trials and experimental studies were suitable for review. The diode laser was presented as an effective tool in soft tissue management due to its cutting precision, incision depth, analgesic effects, and elimination of bacterial load and in periodontal applications for probing depth reduction when used as an adjunct to scaling and root planing (SRP). LEDs also served as an effective tool for pain management, wound healing, and efficacy when used as an adjunct to SRP. Other than one study, all the available studies reviewed were either evaluating the efficacy of diode lasers or LEDs, but not both. Therefore, the results for determining the more effective tool were inconclusive.

Conclusions: According to existent data, diode lasers and LEDs are equally effective tools for the phototherapy in periodontology and oral surgery. Although fewer studies exist examining the use of LED for phototherapy, the studies all revealed positive results. Further clinical comparative investigations utilizing both diode lasers and LED are needed to determine superiority of this application for periodontal management and oral surgery.

Keywords: diode laser, light-emitting diode, phototherapy, periodontitis, soft tissue

Introduction

A DIODE LASER is a semiconductor device that can directly convert electrical energy into light. First patented in 1957 as semiconductor lasers, diode lasers produce coherent, monochromatic light by stimulated emission of radiation. Similarly, light-emitting diodes (LEDs) utilize high-efficiency semiconductors; however, in doing so they emit noncollimated, noncoherent light in a narrow spectrum.¹

When electricity is run through the semiconductor, it produces a light that is in the ultraviolet, visible, and near-infrared ranges of the electromagnetic spectrum. The composition of the semiconductor chip determines the wavelength of light that is emitted. The resulting wavelength determines the depth of the tissue penetration of the target tissue.²

Lasers were first introduced in dentistry with the preliminary application of lasers on vital oral tissues in 1969. Alternatively, when first invented in 1962, LEDs were not as

Laboratory of Periodontal-, Implant-, Phototherapy (LA-PIP), Department of Periodontology, School of Dental Medicine, Stony Brook University, Stony Brook, New York, USA.