

Pips: The Photoacoustic Wave of Future

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From everyday dentistry to advanced photoacoustic endodontic applications: Er:YAG and Nd:YAG dual wavelength laser.

Lasers provide an exciting new technology that allows the dentist the ability to give patients optimal care without many of the “fear factors” found in conventional dental techniques. Used with proper understanding of laser physics, lasers are extremely safe and effective.

Using lasers for caries removal, endodontic treatment and soft-tissue procedures can reduce postoperative discomfort and infection, and provide safe, simple in-office treatment. As a result, we can improve our efficiency, expand what we can do, achieve better results and increase production.

The practice of endodontics has been around for a long time, slowly evolving over the years. The dental pulp has been described by Pierre Fauchard in the 17th Century.

The main goal of endodontic treatment is the elimination of the root canal system as a source of apical periodontitis. The removal of the inflamed and/or necrotic dental pulp (and associated bacteria) led to resolution of apical periodontitis. We as clinicians have been greatly successful at achieving this goal without 100% elimination of tissue debris and bacteria from the root canal system.

Recent advances in technology and techniques attempt to clean and disinfect the root canal system.

In my opinion the most prominent of the laser irrigation systems is called the PIPS system i.e. Photon Induced Photoacoustic Streaming. This system utilizes a low-energy laser light to propagate acoustic waves that aid in more evenly distributing the irrigation solution across the entire root canal system.

The PIPS system utilizes an Er:YAG laser set to an energy level of 20mJ at 15Hz. The laser is fired in impulse bursts of 50 microseconds with a peak power of 400W using a tip that remains in the coronal aspect of the access preparation. These impulses create shockwaves (photoacoustic agitation) within the root canal system leading to a three-dimensional streaming of fluids as far as the apical foramen.

These disruptive technologies will no doubt improve the outcomes of endodontic therapy and reduce the need for retreatments. Currently, gutta percha remains the material of choice for obturation; however research is currently underway to attempt to regrow/regenerate the dental pulp. That in combination with the complete elimination of bacteria from the pulp space will no doubt be the holy grail of endodontics and is the ultimate goals of currently underway research studies.....stay tuned!

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