

## Technical Report

# An Innovation for Many Indications

Morita AdvErL Evo: Successful therapies with Er:YAG-Laser technology

**Laser pointers, Blu-ray players, distance meters: State-of-the-art laser technology can be found in many everyday devices and also has become a fixed part of therapies and many medical disciplines – for example, in emergency surgery, ophthalmology or dentistry. For more than a century, Morita has been developing innovations for dental procedures. For twenty years, Morita has been providing high-tech lasers to improve oral health. The new Er:YAG-Laser AdvErL Evo is a minimally invasive treatment option combined with a future-oriented technology that is based on the long-standing experience of a leading manufacturer of dental equipment. It is a path-breaking therapeutic device for a wide range of indications.**

Laser, short for Light Amplification by Stimulated Emission of Radiation, basically denotes a light source: in the figurative sense it refers to the combined effect of high intensity and the extreme bundling of a beam of light – the result of which is concentrated energy. More than 50 years after the first experiments of using lasers in dentistry, different types of lasers such as CO<sub>2</sub>, Nd:YAG, Er:YAG, Diode or Argon are being used. Morita can look back on 30 years of experience in the field of laser technology and 10 years of development expertise. Amongst others, patients suffering from periodontitis, caries or peri-implantitis benefit from this long-standing experience. The third generation of AdvErL Evo lasers is based on the Er:YAG technology. It unites minimally invasive procedures with simple handling and stylish design. Moreover, its features support smooth workflow in dental practices.

### **Er:YAG-Laser – optimal for dental treatments**

Er:YAG laser technology is particularly well suited for dental applications because of its special wavelength: The wavelength of these lasers – they typically emit light

with a wavelength of 2,940nm – lies in the infrared range and, hence, is readily absorbed by water (70% of the human body is made up of water). The light is generated by an yttrium aluminum garnet (YAG) crystal and transported to the handpiece, whose optical tip emits the laser beam: it either can come into direct contact with tissue (soft tissue) or be held at a distance of about three to five millimeters (hard substance). Contrary to CO<sub>2</sub> and Nd:YAG lasers, the irradiation is limited to the surface of the tissue and does not penetrate deeper layers. This prevents coagulation of the tissue and promotes quicker healing. In this way, Er:YAG lasers protect the natural body substances as prescribed for minimally invasive therapies. Corresponding forms of treatment are the order of the day in current dentistry. In particular complex procedures such as the treatment of deep periodontal pockets or peri-implantitis call for gentle treatments as well as a precise and safe mode of working. The advantages for patients are obvious: the technology is virtually painless and, contrary to alternative methods, allows gentle treatments without any relevant development of heat or vibrations, and no anesthesia is needed. In addition, antibiotics are not required in connection with laser-based treatments – another step towards reducing the increasing risk of resistance.

### **State-of-the-art dentistry**

Morita's AdvErL Evo makes endodontics more versatile in more than one way: when used with the thin tips, the handpiece that is formed like a scaler allows an unobstructed view of the root structures and removes debris from the canal in about 20 seconds – a noteworthy advantage compared to such methods as, for example, passive ultrasonic irrigation. This helps find the apex and improves root canal debridement. Clinical studies show that, compared to alternative methods, Er:YAG lasers remove debris more effectively<sup>1</sup> In addition, Er:YAG laser systems can target such wide-spread diseases as periodontitis or caries. Besides younger patients, adults and elderly patients are subject to an increased risk, for example, of root caries<sup>2</sup>. AdvErL Evo offers many advantages, in particular with respect to initial caries treatments, cervical fillings as well as the removal of caries close to the

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<sup>1</sup> Yao K, Ide A, Satake K, Ichikawa M, Watanabe S, Anjo T, Ebihara A, Kobayashi C, Suda H (2014). Er:YAG Laser-activated Irrigation for Lateral Canals. 14th World Congress for Laser Dentistry. 02.-04. Juli 2014, Paris. Abstract Nr. 64558. Online: <http://www.wfld-paris2014.com/images/Abstracts%20book%20IWC%20&%20WFLD.pdf>

<sup>2</sup> Vierte Deutsche Mundgesundheitsstudie (2005). Kassenzahnärztliche Bundesvereinigung und Bundeszahnärztekammer. Online: <http://www.bzaek.de/fileadmin/PDFs/presse/dms/brosch.pdf>

dental pulp. Lasers cover a wide spectrum of indications from caries removal to preparation to surface roughening of class I, II, III, IV and V cavities. In addition to conserving the substance, another advantage of laser treatments is that the tooth suffers less trauma and the bonding of adhesive restorations is improved.

Implants may be followed by peri-implant mucositis and/or peri-implantitis, and these indications still are a challenging clinical problem. Now an innovative method for an effective peri-implantitis therapy is realizable with AdvErL Evo<sup>3</sup>: The fundamental concept is based on reactivating the surface by means of “micro-explosions” that occur when laser energy is absorbed by water, whose volume then increases 800 to 1000 times in the next moment. These explosions remove inflamed tissue but also effectively fight the resident bacteria in the tissue and in this way virtually excludes any risk of bacteremia. The contaminated layers on the surface of the implant are removed effectively – albeit without having any negative effects on osseointegration<sup>4,5</sup>. Whereas therapies with AdvErL Evo also cover cases of CIST class D (CIST=Cumulative Interceptive Supportive Therapy<sup>6</sup>) now, established methods allow for successful treatments only up to CIST class C. Furthermore, research shows that Morita’s Er:YAG laser is particularly efficient on titanium surfaces<sup>7</sup>.

## Conclusion

Therapies with AdvErL Evo promise treatment results that can hardly be achieved with classic methods: the treatment is minimally invasive, painless as well as without strong vibrations or development of heat; therefore, it is gentle on tissue and, consequently, more pleasant for patients. Patients will perceive the local treatment with its disinfection effect and without anesthesia as far more pleasant

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<sup>3</sup> BDIZ EDI konkret (2012): Periimplantitis-Therapie. BDIZ EDI konkret 3/2012, S.118. Online: [https://www.bdizedi.org/bdiz/web.nsf/gfx/1B8D5D1897351363C1257AD400330AB9/\\$file/BDIZ\\_03\\_12\\_ZFG.pdf](https://www.bdizedi.org/bdiz/web.nsf/gfx/1B8D5D1897351363C1257AD400330AB9/$file/BDIZ_03_12_ZFG.pdf)

<sup>4</sup> Yoshino T, Yamamoto A, Ono Y (2015). Innovative Regeneration Technology to Solve Peri-implantitis by Er:YAG Laser Based on the Microbiologic Diagnosis: A Case Series. *Int J Periodontics Restorative Dent* 2015;35:67–73. doi: 10.11607/prd.2116

<sup>5</sup> Nevins M, Nevins ML, Yamamoto A, Yoshino T, Ono Y, Wang CW, Kim DM (2014). Use of Er:YAG Laser to Decontaminate Infected Dental Implant Surface in Preparation for Reestablishment of Bone-to-Implant Contact. *Int J Periodontics Restorative Dent* 2014;34:461–466. doi: 10.11607/prd.2192

<sup>6</sup> Mombelli A, Lang NP (1998). The diagnosis and treatment of peri-implantitis. *Periodontol* 2000 1998;17:63–76.

<sup>7</sup> Yamamoto A, Tanabe T (2013). Treatment of Peri-implantitis Around TiUnite-Surface Implants Using Er:YAG Laser Microexplosions. *Int J Periodontics Restorative Dent* 2013;33:21–29. doi: 10.11607/prd.1593

100<sup>Years</sup>  
+  
A Century of Innovation



than previous methods. Yet, this form of treatment not only improves the patients' quality of life, dentists and their teams will benefit from the high comfort offered by AdvErL Evo, too. Morita's laser system scores points because of its numerous advantages compared to conventional therapies and alternative laser technologies. And, last but not least, it is an innovative step on the way into the dentistry of the future.