# 30 years of laser dentistry

## Innovations, clinical impact and the future

An interview with Dr Frank Liebaug, Germany

**Over the last three decades**, laser technology has revolutionised modern dentistry, becoming an essential tool for various treatments, from soft-tissue management to implantology. What was once considered an expensive and cumbersome innovation has now evolved into a user-friendly, accessible, and highly effective treatment modality. Diode lasers, in particular, have become a standard in dental practices worldwide, offering advantages such as precision, reduced bleeding, and enhanced patient comfort.

Join *implants—international magazine of oral implantology* as we get a closer look at the evolution of dental laser technology and learn about MEDENCY's radial decontamination protocol (RDP).

**Over the past 30 years, how has laser technology evolved in dentistry, and what have been the most significant breakthroughs?**
The beginnings of the use of laser devices in medicine and in dental therapy date back more than half a century. The first devices were the size of refrigerators or washing machines and were mostly gas or solid-state lasers. Their application was limited, and the devices were clunky for oral use because they employed mirror arm systems that directed the laser light to the application site. The price of such technology, which was considered futuristic at the time, was exorbitantly high for private dental practitioners. Nevertheless, there were enthusiasts who incorporated this innovative technology into their daily practice.




For exactly 30 years now, diode lasers have been established as a standard tool for daily treatment in dental practices. These devices are small, user-friendly and now affordable for every practitioner. Their intra-oral application has been greatly facilitated by flexible optical fibres, making the process significantly more ergonomic.

**What are the key advantages of laser-assisted treatments compared with conventional methods in implantology and soft-tissue management?**
Important advantages of laser-assisted treatments include the immediate reduction of bacteria, the absence of vibration or pressure, and the ability to achieve haemostasis or perform surgical procedures with reduced bleeding. The use of diode lasers enables minimally invasive, precise and atraumatic treatment.

**MEDENCY, an Italian company specialising in the development and production of cutting-edge medical laser systems, introduces the Radial Decontamination Protocol (RDP)—a breakthrough laser-based solution for implant maintenance and disease treatment. Can you explain what the RDP is and how does it improve implant treatment outcomes?**
From my perspective, the MEDENCY RDP is best applied in the treatment of peri-implant mucositis and periodontitis. When laser therapy is applied correctly, it can reduce the risk of peri-implantitis. Clinical experience shows that, when early peri-implant mucositis is treated with laser-assisted antimicrobial photodynamic therapy using a diode laser and an appropriate photosensitiser, the disease is reversible and can heal almost completely, avoiding bone loss around the implant. However, a recall every four months is recommended, and if necessary, the therapy should be repeated for localised bacterial reduction.

It is important to distinguish between peri-implant mucositis and established peri-implantitis, which involves bone resorption and irreversible bone defects. For peri-implant

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mucositis, diode lasers with wavelengths of 635 nm and infrared (810 or 980 nm) are used. These are combined with a photosensitiser to decontaminate the difficult-to-access microscrews and threads on a rough implant surface. Care must be taken to avoid overheating the implant with laser energy.

In the case of established peri-implantitis, Er:YAG or Er,Cr:YSGG lasers are additionally used. However, in these cases, the implant surface must first be exposed and made accessible through flap elevation. The prospect of clinical success in such cases is significantly lower. The goal here is also to clean the implant surface without overheating, which could lead to implant loss. In these situations, tissue regeneration is combined with augmentation procedures.

**What specific benefits does the MEDENCY RDP offer in managing peri-implantitis and peri-implant mucositis?**
In my clinical experience, I have observed an accelerated initial healing phase, which is likely due to the significant reduction of microbial load compared with other treatments.

**The MEDENCY RDP achieves bacterial decontamination and tissue healing. How does this affect patient recovery time and long-term implant success?**
The high precision of radial laser tissue decontamination, coupled with the minimal invasiveness of its optical fibre, significantly reduces surrounding tissue trauma. This leads to decreased inflammation, swelling, and postoperative pain. Integrating this laser system with conventional methods ensures comprehensive treatment outcomes.

**From a clinician's perspective, how user-friendly is the MEDENCY RDP in daily dental practice?**
Modern dental treatment is generally characterised by high complexity. Contemporary diode laser devices, such as TRIPLO from MEDENCY, feature intuitive menu navigation and are easy to operate via a touch screen display. A systematic approach, incorporating preset treatments and specific protocol steps, enables dentists to prevent and treat primary pathologies related to dental implantology.

**What kind of training and support does MEDENCY provide for dental professionals looking to integrate laser technology into their workflows?**
MEDENCY and the DR. LIEBAUG Dental School in Steinbach-Hallenberg in Germany regularly offer continuing education programmes for dental professionals from Germany and abroad. MEDENCY distributors worldwide offer regular training courses, which will soon include an introduction to the RDP system.

In addition to specialised training tailored to beginners and advanced practitioners, we offer courses for laser safety officers in accordance with legal requirements. Course participants receive a certificate upon successful completion of a written final examination.

**In your opinion, what is the advantage of MEDENCY lasers compared with lasers from other manufacturers?**
When comparing laser devices of the same wavelengths—essentially of the same type and with similar functions (e.g. single-wavelength diode lasers or three-wavelength diode lasers)—diode lasers consistently deliver effective clinical results. You may observe differences in usability, such as how power levels are adjusted or how settings like pulse frequency are changed. However, these operational differences are not the key factor in successful therapy.

Far more important is a well-established approach to treatment based on clinical experience and scientific evidence. Such structured approaches form the foundation for successful laser-assisted treatment and can be adapted to individual patient needs and the clinician's

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experience. This is where both beginners and advanced users of laser will find the true value.

The new radial fibre tip and advanced diode laser featuring three different wavelengths from MEDENCY is a tool that allows for precise and effective work. We offer training, sharing our clinical experience, scientific foundations and study results through our continuing education institute multiple times a year.

In our hands-on training courses and workshops, participants can actively assist in live operations on patients. Lecture content is also available via video transmission, and face-to-face training sessions are possible. The knowledge gained is reinforced through hands-on exercises on models, ensuring a practical learning experience.

**The MEDENCY RDP incorporates laser-assisted full-mouth disinfection. How does this approach compare to conventional decontamination techniques in terms of efficiency and outcomes?**
Laser-assisted full-mouth disinfection offers clear advantages in the treatment process compared with purely localised laser therapy on affected teeth or implants. This is primarily due to the overall improved microbial reduction in the oral cavity.

Using flexible laser fibre tips, even difficult-to-reach areas, such as bifurcations, trifurcations or the threads of implants, can be effectively accessed. The use of the new radial fibre tip further enhances efficiency compared with previous applications. It is now our task to substantiate these benefits through clinical studies.

**There being continuous advancements in laser technology, what developments do you foresee in the next decade for laser-assisted implantology and periodontal care?**
Dental technologies, including laser medicine and the development of new laser devices, are closely tied to technological advancements. Given laser technology's established presence in dentistry for over three decades, predicting a radical shift is challenging. Dental advancements, however, remain closely linked to broader technological progress.

An intuitive control panel and the integration of safety levels into the software accompanying a laser device are essential. This ensures that incorrect settings for energy density and pulse rate are minimised for the selected indication. Effective collaboration between clinicians, engineers and software developers is crucial in this regard.

Medical history has repeatedly shown that visionary ideas often take a long time before they become widely accepted in daily clinical practice by professionals and patients. Visionaries have never had an easy path, but we will not give up.

**Thank you for the insightful conversation!**

DR. LIEBAUG Dental School

Dr Frank Liebaug

## about the interviewee



**Dr Frank Liebaug**, M.D., has been a professor at Shandong University in China since 2010, where he teaches at the School of Stomatology in the Department of Implantology.
In addition to his academic and clinical work at Shandong University, he is a globally recognised speaker in implantology and laser dentistry. He delivers lectures and hands-on workshops both nationally and internationally.
He conducts clinical workshops worldwide, including live surgeries and hands-on training for fellow professionals.
Dr Liebaug has authored numerous scientific publications in German, English, Russian, Polish, French, and Chinese.
In Steinbach-Hallenberg, Germany, he runs a dental practice with his son, Dr Alexander Liebaug. The practice specialises in regenerative periodontitis therapy (GBR, GTR), implantology, peri-implant infections, jaw ridge augmentations, laser-assisted endodontics and periodontology, dental sleep medicine, and acupuncture.

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## IMPLANTOLOGY AND GENERAL DENTISTRY

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