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Dr Georg Bach

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Defining the future of implantology

Dear colleagues!

As we embark on another exciting year in the field of oral implantology, we are thrilled to present this latest issue of *implants—international magazine of oral implantology*. This edition reflects the dynamic evolution of our specialty, showcasing groundbreaking research, clinical advancements, and the continued pursuit of excellence that defines modern implantology.

One of the most promising developments in dental imaging is the introduction of dental-dedicated MRI (ddMRI). This revolutionary technology eliminates ionising radiation while providing unprecedented insights into soft-tissue diagnostics. As detailed in this issue, the implications for pre-implant assessment, oral surgery, and comprehensive treatment planning are vast. With ongoing research at esteemed institutions, ddMRI is poised to redefine diagnostic standards in implantology.

Beyond imaging, regenerative techniques continue to shape our field. The use of periosteum as a regenerative tool in alveolar bone augmentation exemplifies how innovation is improving clinical outcomes. This novel technique, detailed in our case report, highlights the potential of biological scaffolds in enhancing bone regeneration and optimising implant success.

The connection between periodontitis and systemic health is another critical topic we explore. The growing body of evidence linking periodontal disease to conditions such as cardiovascular disease, diabetes, and even neurodegenerative disorders underscores the importance of comprehensive oral health care. Understanding these connections allows us to adopt a more holistic approach

to implant therapy, ensuring not only successful osseointegration but also overall patient well-being.

The global implantology community thrives on collaboration and knowledge exchange, and 2025 is set to be a landmark year for scientific gatherings. Events such as EuroPerio11 and the 3rd European Congress for Ceramic Implant Dentistry offer unparalleled opportunities for learning, networking, and sharing best practices. Additionally, the International Dental Show (IDS) 2025 will once again serve as a hub for industry advancements, bringing together professionals from around the world to explore the latest innovations.

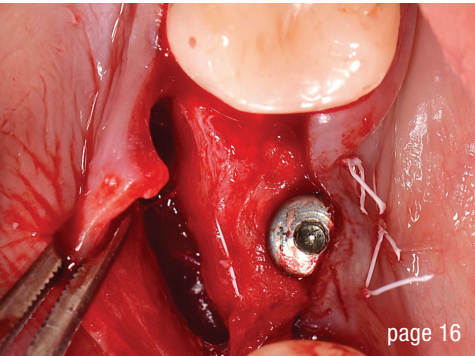
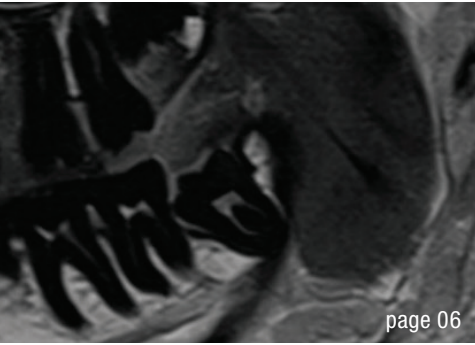
At the core of our profession is the commitment to patient-centered care, evidence-based practice, and continuous learning. Through this magazine, we aim to provide you with valuable insights, clinical pearls, and the latest research to support your daily practice and inspire your professional growth.

Enjoy reading this issue and let us continue shaping the future of implantology together!

Sincerely,

Dr Georg Bach
President of the German Association
of Dental Implantology





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[1] Semper-Hogg, W, Kraft, S, Stiller, S et al. Analytical and experimental position stability of the abutment in different dental implant systems with a conical implant-abutment connection Clin Oral Invest (2013) 17: 1017.

[2] Semper Hogg W, Zulauf K, Mehrhof J, Nelson K. The influence of torque tightening on the position stability of the abutment in conical implant-abutment connections. Int J Prosthodont 2015;28:538-41.

Dental-dedicated MRI—a new imaging technique in implantology?

Dr Georg Bach & Markus Bach, Germany



Fig. 1: Flexible coil of the ddMRI device.

At the 2024 European Congress of DentoMaxilloFacial Radiology in Freiburg in Germany, Dentsply Sirona and Siemens Healthineers unveiled the first MRI system specifically designed for dental applications—or dental-dedicated MRI (ddMRI), marking a significant breakthrough in dental imaging. Two key advantages of the MAGNETOM Free.Max Dental Edition MRI unit were highlighted: its complete elimination of ionising radiation and the unprecedented possibilities it provides in dentistry. Notably, it enhances soft-tissue diagnostics, offering unparalleled insights and precision. This article examines the development, advantages, limitations and clinical applications of dental MRI, giving particular focus to its role in pre-implant diagnostics, oral surgery and other dental specialties. It also discusses the technological advancements that have made MRI a viable imaging modality in dentistry and its potential impact on future clinical practice.

Although, the debut of the first dental MRI system was a landmark moment, it was the result of nearly two de-

acades of dedicated research. By early 2023, the development process had advanced significantly, providing the first promising indications that the technology could be presented to the public. This progress culminated in a symposium in the spring of 2023, attended by approximately 50 experts, primarily from academic institutions, who gathered to review and discuss the preliminary findings.

The initial results were so compelling that both the companies involved and the panel of experts agreed to collaborate on the scientific integration of MRI in dentistry. As part of this initiative, Siemens Healthineers provided a modified version of its current low-field MRI system, MAGNETOM Free.Max, which was installed at Aarhus University in Denmark. Under the leadership of Prof. Rubens Spin-Neto from the Section for Oral Radiology and Endodontics at the Department of Dentistry and Oral Health, extensive research efforts were launched to both enhance hardware components, such as the receiving coil, and develop workflows specifically tailored for dental applications with the clear objective of establishing MRI as a viable and integral tool in dentistry.

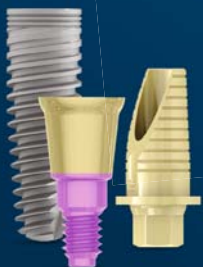
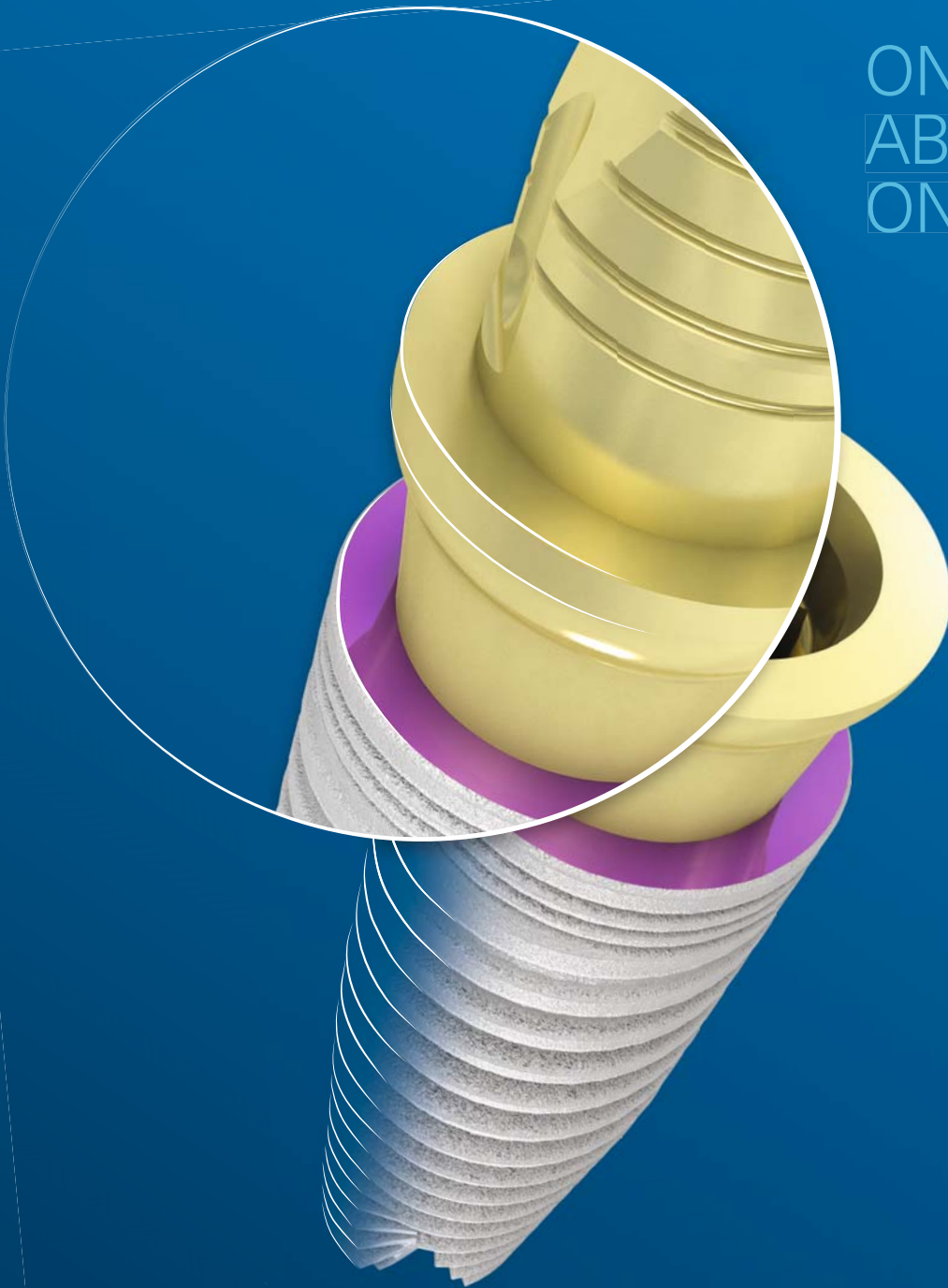
“Achieving truly practice-friendly device dimensions remains a challenge.”

Current status

The collaborative research efforts have yielded remarkable success. In just one year, MAGNETOM Free.Max Dental Edition was introduced. The ddMRI system differs significantly from conventional medical MRI machines. While standard MRI systems operate at field strengths of 1.5 or 3.0 T, the ddMRI utilises a reduced field strength of 0.55 T. This reduction has been achieved primarily through advanced software-based innovations in signal processing, incorporating AI-driven algorithms to enhance image quality and accelerate data acquisition.



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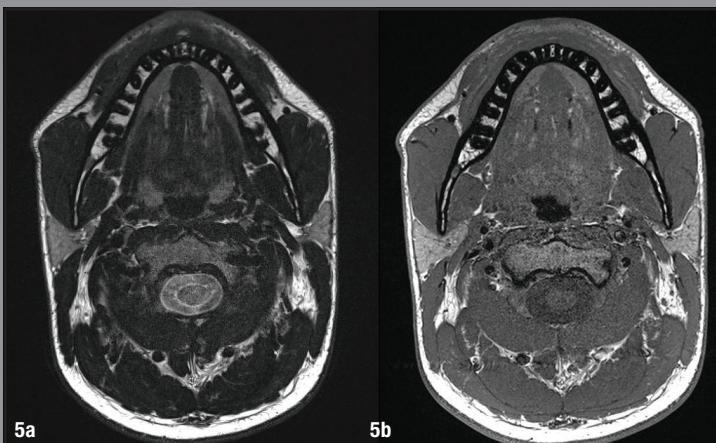
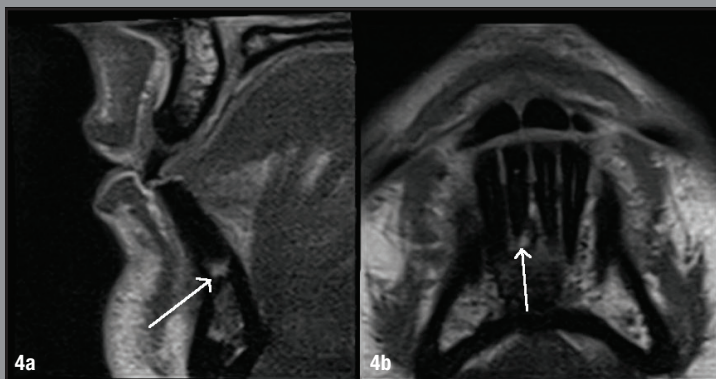
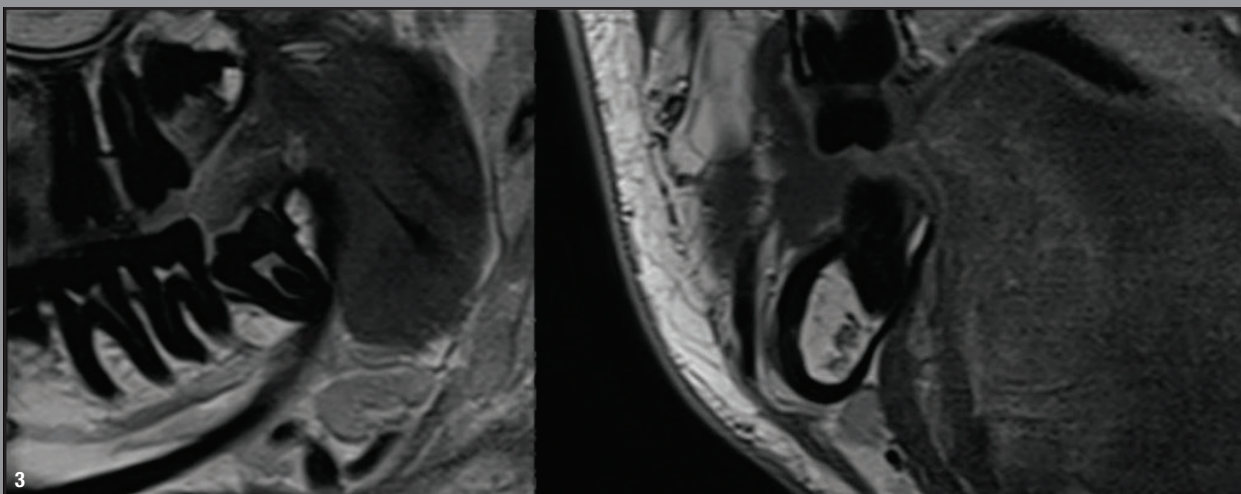
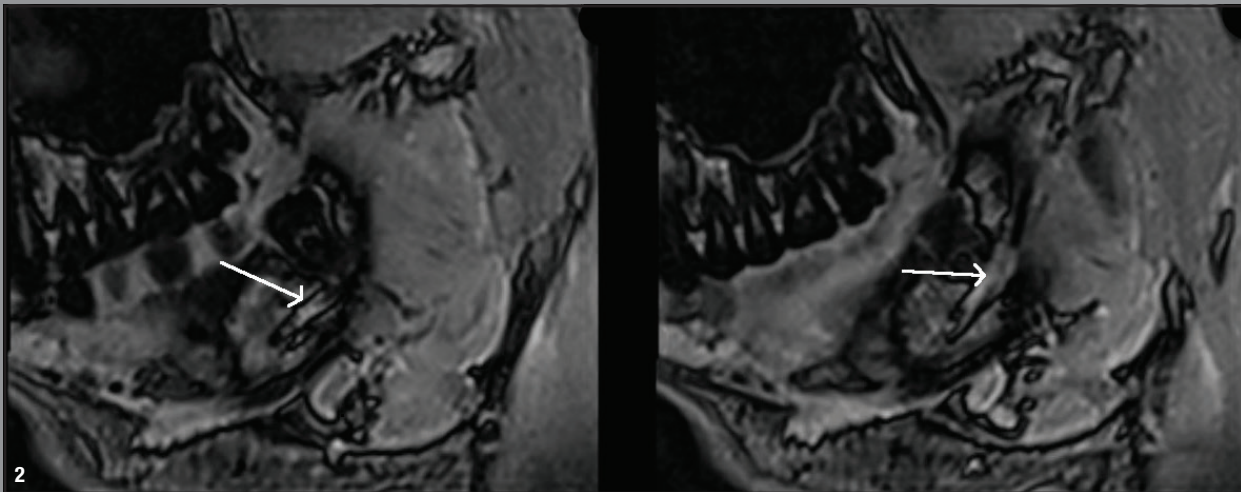


Fig. 2: Course of the inferior alveolar nerve. Sagittal FLAIR sequence illustrating the nerve's pathway in relation to an impacted lower wisdom tooth.

Fig. 3: T1-weighted Turbo Spin Echo (TSE) imaging of the impacted tooth 48, presented in sagittal (left) and axial (right) sections.

Figs. 4a+b: T2-weighted Turbo Spin Echo (TSE) sequence of the mandibular anterior region, clearly depicting a hyperintense zone apical to tooth #41, indicative of an acute inflammatory process.

Figs. 5a+b: Axial sections of a 3.5T MRI, displaying T1-weighted imaging (a) and an additional T1-weighted sequence (b) for a detailed view of the mandible.

Reducing the field strength decreases structural demands, simplifying installation, conserving resources (including helium and energy) and enabling a more compact design. With a smaller footprint, lighter weight and reduced cooling requirements, the ddMRI system offers greater flexibility in installation sites. It operates using Siemens DryCool energy system, requiring just 0.7 l of liquid helium for magnet cooling over its entire lifespan. In contrast, conventional low-field MRI systems in human medicine consume approximately 200 l of helium, which must be regularly replenished. This drastic reduction in helium usage not only lowers acquisition and maintenance costs but also significantly enhances the system's sustainability.

Achieving truly practice-friendly device dimensions remains a challenge. Currently, the ddMRI system is still designed as a whole-body MRI, requiring substantial space. At present, it occupies 24 m²—comparable to the size of a spacious waiting room. Furthermore, despite ongoing efforts to reduce its weight, the system still weighs 32 tonnes.

Given the current hardware, software and application requirements, the primary target audience for the ddMRI unit remains universities and dental clinics. According to the companies involved, these institutions have already shown strong interest in the technology. Once the necessary regulatory approvals have been secured, regular distribution will commence, paving the way for wider adoption in academic and clinical research settings.¹

A major advantage: Radiation-free imaging

The most significant benefit of dental MRI is its ability to generate images without ionising radiation, making it a major advancement in patient safety. Unlike conventional imaging methods such as CBCT and CT, which rely on X-rays that can damage DNA, MRI sequences are produced using a strong magnetic field that aligns protons in the body. As a result, dental MRI eliminates radiation exposure, rendering the principles of as low as reasonably achievable and as low as diagnostically acceptable obsolete. Moreover, without the need to justify radiation exposure, unlimited imaging becomes possible.²

This breakthrough is particularly beneficial for dental specialties that rely on frequent imaging, such as paediatric dentistry, orthodontics and restorative dentistry. Children, in particular, stand to gain from radiation-free imaging, ensuring safer diagnostics without long-term risks. Additionally, dental MRI is an ideal solution for patient groups requiring repeated examinations, such as those undergoing tumour follow-up, pregnant women or other individuals in sensitive life stages where radiation exposure poses long-term risks.³ Beyond these applications, dental implantology stands to gain significantly

from this new technology because it opens up new diagnostic possibilities while ensuring maximum patient safety.

Advantages for oral surgery

Besides long-term patient safety and superior visualisation of soft-tissue structures, dental MRI offers several further advantages over conventional imaging modalities used in dental practice, such as CBCT and panoramic radiography.⁴⁻⁶ One notable capability is the precise localisation of the inferior alveolar nerve within the mandibular canal during third molar surgery. Compared with conventional imaging techniques, dental MRI provides clearer native visualisation, reducing the risk of nerve damage and improving surgical planning.⁷ Additionally, MRI surpasses other imaging methods in the early detection of diseases with significant soft-tissue involvement.⁸ They offer detailed visualisation of muscles, nerves and ligaments, making them particularly valuable for identifying pathological soft-tissue processes such as tumours at an early stage.⁹

“The most significant benefit of dental MRI is its ability to generate images without ionising radiation, making it a major advancement in patient safety.”

Advantages for dental implantology

In dental implant planning, dental MRI offers a key advantage: the precise localisation of nerves and soft-tissue structures, such as the gingiva, and their anatomical relationship to the planned implant site. This level of detail is crucial for ensuring accurate implant placement and minimising surgical risks.^{10,11}

While conventional CT excels in bone visualisation, early studies on implant planning using dental MRI have shown promising results, addressing one of the key limitations of MRI in comparison to CT. Research conducted both *in vitro* and on patients has successfully demonstrated the feasibility of implant planning and guided implantation using CAD/CAM techniques.^{12,13} For optimal implant planning in complex intra-oral anatomies, a hybrid approach combining ddMRI and CT should be considered. This integration would allow practitioners to leverage the supe-

rior soft-tissue visualisation of ddMRI while benefiting from the detailed bone representation of CT, ultimately leading to more precise and predictable treatment outcomes.

3D visualisation

For years, the primary advantage of CT and CBCT has been their ability to generate 3D datasets. In CT imaging, a dataset is acquired that can be reconstructed in multiple planes, including sagittal, coronal and transverse views. However, recent advancements in dental MRI technology now also enable high-quality 3D visualisation, bridging the gap between these imaging modalities.¹⁴

“This technology has enormous potential.”

Additionally, functional MRI has long been used to assess motion-related soft-tissue pathologies, particularly in the diagnosis of temporomandibular disorder. This capability allows for a more comprehensive evaluation of temporomandibular joint function and pathology, offering valuable insights beyond static imaging.¹⁵

Disadvantages and limitations of dental MRI

One disadvantage of MRI compared with other imaging techniques in dentistry is the duration of the scanning process. CT scans are typically acquired within seconds, whereas each MRI sequence usually takes several minutes. During the scan, the patient must remain still because any movement can significantly reduce image quality owing to motion artefacts. However, recent advancements have led to the development of faster scanning protocols.

The development of MRI-compatible dental implants has helped overcome one of the previous drawbacks of all imaging techniques, the generation by dental implants of significant artefacts in the images.¹⁶ Newer materials and techniques reduce these artefacts and improve the quality of MRI scans in patients with dental implants. Consequently, new scanning protocols also focus on suppressing implant-related artefacts.^{17,18}

In general, the visualisation of teeth in MRI still has limitations. However, initial approaches are being explored to enhance dental imaging using AI-assisted techniques.¹⁹

Another key limitation of MRI in dentistry is its cost and limited availability. Many dental practices, particularly those outside hospital settings, lack access to MRI refer-

als within a reasonable time frame. However, ongoing research and technological advancements in dental MRI are expected to help reduce costs and improve accessibility in the coming years.

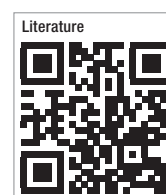
Additionally, dental MRI systems require specific technical modifications compared with MRI scanners used in medical radiology.²⁰ As previously mentioned, MAGNETOM Free.Max Dental Edition introduces promising solutions to these challenges, paving the way for broader adoption in dental diagnostics and treatment planning.

Preliminary conclusion

No statement encapsulates the promise of dental MRI better than the words of neuroradiologist Dr Monika Probst: “This technology has enormous potential.” The future significance of this innovation is underscored by a notable shift within the German Society of Dentistry and Oral Medicine. Its well-known working group on radiology (Arbeitsgemeinschaft Röntgenologie) has been renamed the Arbeitsgemeinschaft für Bildgebung in der Zahn-, Mund- und Kieferheilkunde (working group on imaging in dentistry and oral medicine).²¹ This change reflects the evolving landscape of dental imaging, to which MRI and ultrasound—both non-radiological technologies—are becoming integral. As a result, the term “radiology” no longer fully represents the expanding spectrum of imaging techniques, necessitating its replacement. Among these advancements, dental MRI stands out as the most promising, offering unparalleled potential for future developments and groundbreaking applications in dentistry.

Acknowledgement

We extend our gratitude to Profs Rubens Spin-Neto (of the University of Aarhus in Denmark) and Ralf Schulze (of the University of Bern in Switzerland) for generously providing the ddMRI images.



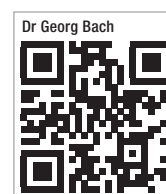
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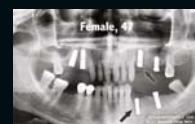
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Impact of periodontitis on systemic health and on implants—Part 2



Prof. Curd Bollen, Prof. Paul Tipton, UK & Prof. Gagik Hakobyan, Armenia

In this issue, we delve deeper into the topic with the second part of the article, building upon the foundation laid in the first part. The goal is to provide further insights and explore the topic in even greater depth.

As stated in the first article: mouth and health go hand in hand. The oral cavity is the ingress to the rest of our body. Our nutrition enters there, and our teeth masticate this food so that all the alimentary components we need can be released to our complete body.

Infections in the oral cavity therefore have a huge impact on the general health. After all, chewing forces push intra-oral periodontal bacteria into our bloodstream. This process can cause severe collateral damage. In the first part of our article, we discussed the impact of periodontal pathogens on cardiovascular diseases, diabetes, respiratory diseases, pregnancy, rheumatoid arthritis and chronic kidney disease.

In this second article we will highlight six other key points about the relationship between periodontitis (i.e. periodontal pathogens) and systemic diseases.

7. Alzheimer's disease

Alzheimer's disease is a progressive neurodegenerative disorder characterised by cognitive decline, memory loss, and changes in behaviour. Three key aspects play a role: accumulation of amyloid-beta peptides, aggregation of hyperphosphorylated tau protein and chronic neuroinflammations in the brain.¹

Periodontitis increases the risk of Alzheimer's because periodontopathogens increase the production of the amyloid beta peptides, which occurs in the brain damage in Alzheimer's patients. Moreover, both Alzheimer's and periodontitis are associated with increased oxidative stress, which can damage tissues and cells.²

The impact of periodontitis on Alzheimer's disease is based on three mechanisms:

- 1. Bacterial translocation:** periodontal pathogens, such as *P. gingivalis*, can enter the bloodstream and reach the brain, potentially contributing to the formation of amyloid plaques and neurofibrillary tangles.
- 2. Inflammatory mediators:** cytokines and other inflammatory mediators produced in response to periodontal infection can cross the blood-brain barrier, promoting neuroinflammation.³
- 3. Immune response:** chronic periodontal infection can lead to a systemic immune response that affects the central nervous system.

Recent studies have shown a higher prevalence of periodontitis in individuals with Alzheimer's disease compared to those without. Some trials indicate that treating periodontitis can reduce systemic inflammation and potentially slow cognitive decline in Alzheimer's patients.⁴

Therefore, screening and diagnosis for Alzheimer's patients is important to manage and prevent periodontitis. Screening and diagnosis for periodontitis patients could be combined with monitoring cognitive functions and evaluating for signs of cognitive decline.

8. Erectile problems

Erectile dysfunction is the inability of a man to achieve or maintain an erection sufficient for satisfactory sexual performance.

It can result from various factors, such as physical causes (cardiovascular disease, diabetes, or hormonal imbalances), psychological causes (stress, anxiety, and depression) or lifestyle factors (smoking, excessive alcohol consumption, and lack of physical activity).⁵

The relationship between erectile dysfunction (ED) and periodontitis is an emerging area of research, with grow-

ing evidence suggesting that periodontal health may influence sexual health.⁶

There are four shared mechanisms between both problems:

- 1. Chronic inflammation:** ED and periodontitis involve chronic inflammation. Periodontal inflammation can contribute to systemic inflammation, which may affect erectile function. Periodontal infections increase levels of systemic inflammatory markers such as C-reactive protein (CRP) and interleukins.
- 2. Endothelial dysfunction:** inflammation from periodontitis can lead to endothelial dysfunction, impairing blood vessel function and potentially contributing to ED. Chronic inflammation and oxidative stress from periodontitis can impair endothelial function, affecting blood flow to the penis and leading to ED.
- 3. Cardiovascular health:** both conditions are linked to cardiovascular health. Periodontitis can exacerbate cardiovascular diseases, which are known risk factors for ED.⁷
- 4. Bacterial translocation:** oral bacteria from periodontitis can enter the bloodstream and potentially affect vascular health, which is crucial for maintaining erectile function.

Studies have shown an association between periodontitis and an increased prevalence of erectile dysfunction. Men with periodontitis may be at higher risk for developing ED. Some trials even suggest that treating periodontitis can lead to improvements in markers of systemic inflammation and potentially improve erectile function.⁸

The same clinical recommendations are again applicable here: good oral hygiene, regular dental check-ups, inter-professional dental–medical collaboration and early screening. Also, lifestyle modifications are encouraged: healthy lifestyle changes, such as a balanced diet, regular exercise, and smoking cessation, to improve both oral and sexual health.

9. Cancer

Cancer encompasses a range of diseases characterised by uncontrolled cell growth and the ability to invade or spread to other parts of the body. Various types of cancer can affect different organs and systems.

Specific periodontitis bacteria are also associated with certain types of cancer, such as pancreatic cancer and especially colon cancer.⁹ As risk factors, genetic predisposition, environmental exposures (e.g. smoking, radiation), and lifestyle factors (e.g. diet, physical activity) are indicated. Furthermore, chronic inflammation as in chronic periodontitis is a known risk factor for the development and progression of many cancers. The persistent inflammation and immune system activation in periodontitis

may influence cancer development and progression by their elevated levels of inflammatory cytokines and biomarkers. Increased oxidative stress is associated with both periodontitis and cancer. Oxidative stress can damage DNA and contribute to carcinogenesis.¹⁰

Certain periodontitis-associated bacteria, such as *P. gingivalis*, have been linked to the development of some cancers, potentially through these mechanisms of chronic inflammation and bacterial toxins.

Specific cancer types and evidence:

- 1. Oral cancer:** there is evidence suggesting that periodontitis may be a risk factor for oral cancers. The chronic inflammatory environment in periodontitis may promote carcinogenic processes in oral tissues.¹¹
- 2. Head and neck cancer:** studies have shown associations between periodontitis and an increased risk of head and neck cancers. Chronic inflammation and bacterial infection in periodontitis may contribute to these cancers.¹²
- 3. Other cancers:** some research suggests associations between periodontitis and increased risk of other cancers, such as pancreatic cancer, though the evidence is less established.

Cancer, however, can also have an impact on periodontitis. Treatments such as chemotherapy and radiation therapy can adversely affect oral health, leading to conditions like dry mouth, mucositis, and increased susceptibility to infections, including periodontitis. Furthermore, cancer and its treatments can impair the immune system, making individuals more susceptible to periodontal infections. Finally, cancer and its treatments can affect nutritional intake and oral hygiene practices, potentially exacerbating periodontal disease.

10. Metabolic syndrome

Periodontitis and metabolic syndrome are interconnected through pathways involving inflammation, insulin resistance, and microbiome alterations. Metabolic syndrome is a cluster of conditions that increase the risk of heart disease, stroke, and type 2 diabetes. It includes several components: central obesity (excessive fat around the abdomen), hypertension (high blood pressure), dyslipidemia (abnormal cholesterol or triglyceride levels), insulin resistance (reduced ability of cells to respond to insulin, leading to high blood sugar levels) and a pro-inflammatory state (elevated levels of inflammatory markers like C-reactive protein [CRP]).¹³

There are several links between periodontitis and metabolic syndrome:

- 1. Chronic inflammation:** periodontitis causes systemic inflammation, characterised by elevated inflammatory

markers such as CRP and cytokines (e.g. TNF- α , IL-6). This chronic inflammation is a key feature of metabolic syndrome, contributing to insulin resistance and endothelial dysfunction.

2. **Insulin resistance:** periodontitis-induced inflammation can exacerbate insulin resistance, a core component of metabolic syndrome. Moreover, the inflammatory cytokines from periodontitis can interfere with insulin signaling pathways.
3. **Microbiome dysbiosis:** both conditions are associated with microbial imbalances. Periodontitis involves pathogenic oral bacteria, while metabolic syndrome is linked to gut microbiome dysbiosis. The oral bacteria from periodontitis can enter the bloodstream and potentially affect the gut microbiome, contributing to metabolic disturbances.¹⁴
4. **Adipose tissue inflammation:** in metabolic syndrome, excess adipose tissue releases pro-inflammatory cytokines. These cytokines can worsen periodontitis by enhancing the inflammatory response in periodontal tissues.¹⁵
5. **Oxidative stress:** both conditions are associated with increased oxidative stress, which contributes to tissue damage and inflammation. Oxidative stress from metabolic syndrome can exacerbate periodontal tissue destruction.

Integrated care by addressing periodontitis, may help reduce systemic inflammation and improve insulin sensitivity, positively impacting metabolic syndrome management.

Lifestyle modifications are however of utmost importance: a balanced diet rich in anti-inflammatory foods (e.g. fruits, vegetables, whole grains) can benefit both conditions and regular exercise improves insulin sensitivity and reduces inflammation, aiding in the management of both periodontitis and metabolic syndrome.

Finally, anti-inflammatory medications and treatments for insulin resistance can benefit both conditions. Probiotics and prebiotics may help restore microbial balance and reduce inflammation.¹⁶

11. Gut dysbiosis

Periodontitis and gut dysbiosis are linked through the complex interplay between oral and gut microbiomes, systemic inflammation, and the immune response. Gut dysbiosis refers to an imbalance in the gut microbiota (overgrowth of harmful bacteria, fungi, or viruses, and a decrease in beneficial bacteria), the community of microorganisms living in the intestines. This imbalance can disrupt normal digestive functions, the immune system, and even overall health.¹⁷

Dysbiosis can cause chronic inflammation in the gut, which can spread systemically. Conditions like inflamma-

tory bowel disease, irritable bowel syndrome, and metabolic disorders can be linked to gut dysbiosis.¹⁸

Again, there is a clear link with periodontitis:

1. **Systemic inflammation:** periodontitis leads to systemic inflammation, which can affect gut health. Similarly, gut dysbiosis can lead to systemic inflammation that affects oral health.
2. **Microbial translocation:** bacteria from the oral cavity can enter the bloodstream and potentially influence the gut microbiota. For instance, *P. gingivalis*, a major pathogen in periodontitis, has been found in the gut and can contribute to dysbiosis.¹⁹
3. **Immune system:** both conditions involve the immune system's response to microbial imbalance and inflammation. Chronic inflammation in one site can influence inflammation in another, creating a bidirectional relationship.
4. **Shared risk factors:** conditions like diabetes, poor diet, and smoking can contribute to both periodontitis and gut dysbiosis. Additionally, the use of antibiotics can impact both oral and gut microbiomes.

Treating periodontitis may improve gut health and vice versa.²⁰ A comprehensive approach to managing both conditions can involve improving oral hygiene, dietary changes, probiotics, and anti-inflammatory treatments. Furthermore, a diet rich in fiber, prebiotics, and probiotics can support a healthy gut microbiome and potentially reduce inflammation associated with periodontitis.

12. Peri-implant mucositis and peri-implantitis

Periodontitis can have a significant influence on the development and progression of peri-implant mucositis and/or peri-implantitis.²⁰ These conditions are primarily driven by bacterial infections. Individuals with a history of periodontitis may have a higher microbial load and increased bacterial diversity, which can contribute to the development of peri-implant mucositis and/or peri-implantitis if implants are placed. In addition, chronic inflammation from periodontitis can affect systemic health and immune response, potentially making patients more susceptible to peri-implant mucositis and/or peri-implantitis.²¹

Individuals with a history of periodontitis may struggle with plaque control, which is crucial for the health of both natural teeth and implants. Poor plaque control around implants can increase the risk of peri-implant mucositis and/or peri-implantitis.²²

Chronic inflammation from periodontitis can result in compromised soft-tissue healing and a heightened inflammatory response around implants, potentially accelerating the progression of peri-implant mucositis and/or peri-implantitis. Since periodontitis often leads to bone loss

around natural teeth, this pre-existing bone loss can affect the bone quality and quantity around implants as well, potentially making the surrounding bone more susceptible to further loss if peri-implant mucositis and/or peri-implantitis occurs.

The same bacteria associated with periodontitis (e.g. *P. gingivalis*, *T. forsythia*) can be found around implants in cases of peri-implant mucositis and/or peri-implantitis. This microbial overlap suggests that a history of periodontitis may contribute to a higher bacterial load around implants. Also, bacterial biofilms formed in periodontitis can extend to implant surfaces, making them more difficult to manage and increasing the risk of peri-implant mucositis and/or peri-implantitis.

The patients' immune system plays a significant role. Chronic systemic inflammation from periodontitis can influence inflammatory responses around implants. Elevated levels of inflammatory markers like C-reactive protein and pro-inflammatory cytokines can contribute to the development and progression of peri-implant mucositis and/or peri-implantitis.²³ In fact, the altered immune response due to periodontitis may affect how the body reacts to the presence of implants, potentially leading to more severe inflammation and tissue damage.

Clinical implications:

- 1. Evaluation of the oral health:** patients with a history of periodontitis should be thoroughly evaluated before implant placement to ensure that periodontal disease is well-managed and under control.
- 2. Risk assessment:** identifying patients with a history of periodontitis as high-risk candidates for peri-implant mucositis and/or peri-implantitis can guide preventive strategies and treatment planning.
- 3. Enhanced oral hygiene:** emphasise rigorous oral hygiene practices to control plaque and prevent both periodontitis and peri-implant mucositis and/or peri-implantitis. Regular brushing, flossing, and the use of antimicrobial mouthwashes are essential.
- 4. Regular monitoring:** schedule regular follow-ups to monitor both periodontal health and the condition of dental implants. Early detection of plaque accumulation and inflammation around implants can prevent the onset of peri-implant mucositis and/or peri-implantitis.²⁴
- 5. Comprehensive management:** patients with both periodontitis and implants should receive comprehensive periodontal care, including scaling and root planing to manage periodontitis and implant surface decontamination to address peri-implant mucositis and/or peri-implantitis.
- 6. Tailored interventions:** treatment plans should be tailored to address both conditions simultaneously. For example, addressing periodontal inflammation and improving oral hygiene can help prevent the development of peri-implant mucositis and/or peri-implantitis.

Conclusion

Understanding the links between periodontitis and systemic diseases underscores the importance of a holistic approach to health, where oral health is considered an integral component of overall well-being. It is meanwhile clear that periodontitis not only can cause tooth loss, but that it can also have an immense impact on the general wellbeing of patients.

A well-organised workflow and substantiated referral system between dentists, physicians and specialists in all disciplines, can help to keep patients in optimal oral and general health.



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Novel technique using periosteum as a regenerative tool in alveolar bone augmentation

Periosteal membrane technique

Drs Cosmin Dima & Iulia Florea, Romania

Severe alveolar bone resorption is a challenge for oral surgeons and implantologists aiming to reconstruct future implant sites. Various alveolar bone augmentation techniques are described for reconstructive surgical treatment of horizontal, vertical and combined alveolar bone defects. Despite the significant improvements in xenografts, allografts and alloplastic grafts that can be used alone or in association with autogenous bone, complications can occur. Most of these techniques require barrier membranes (non-resorbable or resorbable) and occlusive membranes (non-resorbable). Membrane exposure is a complication associated with the decrease of the rehabilitated new bone volume, delay of bone healing or even failure of implant-supported prosthetic restoration when associated with immediate implant placement. The objective of this paper is to present a novel surgical technique that uses adult human periosteum as a barrier membrane in guided bone regeneration of resorbed alveolar areas. The case reported here was a clinical success at the 36-month follow-up (alveolar bone gain of 4.7 mm in width). The benefits of using periosteum are graft stability, better vascularisation, absence of mem-

brane exposure and necrosis risk, faster healing, and no pain or discomfort.

Introduction

Various surgical regenerative procedures have been developed to reconstruct alveolar defects. Most of these techniques are based on the guided bone regeneration (GBR) principle and mainly involve the use of autogenous bone grafts alone or combined with bone substitutes (al-



Fig. 1: Pre-op view of the horizontal bone defect. – **Fig. 2:** Pre-op panoramic radiograph.



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Fig. 3: Crestal incision without sectioning the periosteum. – **Fig. 4:** Measuring of the gingival height. – **Fig. 5:** Elevation of the split-thickness flap starting from the line of incision.

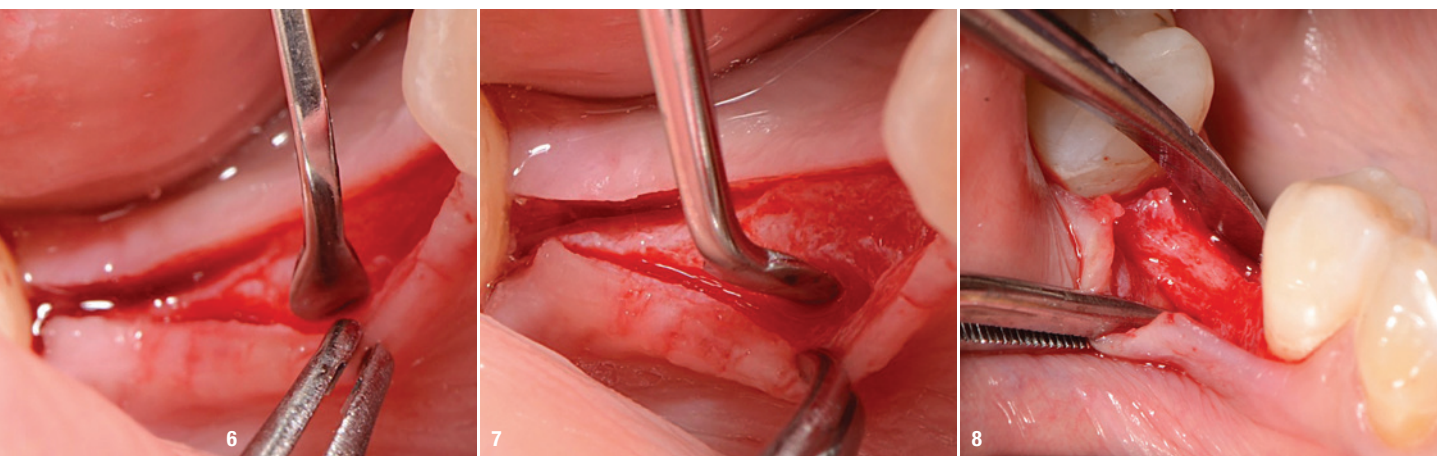


Fig. 6: Detaching the mucogingival junction with a blunt instrument. – **Fig. 7:** Buccal mucosal detachment with a splitting instrument. – **Fig. 8:** Lingual mucosal detachment.

logeneic, xenogeneic or alloplastic grafting biomaterials) in combination with barrier membranes.¹ Autogenous bone grafting is considered the gold standard owing to its osteoconductivity, osteoinductivity and osteogenic potential. The limits of autogenous bone are insufficient local availability and the need to harvest from a second oral surgical site (mandibular ramus and chin) or an extra-oral donor site (iliac crest). This involves general anaesthesia, hospitalisation, longer recovery, higher costs, morbidity risk and postoperative pain.² The use of allogeneic, xenogeneic or alloplastic substitutes brings numerous benefits, such as less operative trauma and blood loss, availability, absence of donor site morbidity and low antigenic potential.³ GBR is the best-documented technique for the treatment of the localised moderate or severe alveolar bone defects.⁴ GBR utilises a barrier membrane to allow osteogenic cells to populate the space of bone defects by excluding epithelial and connective tissue cells.⁵ GBR membranes may be resorbable, for example natural collagen or synthetic polymers with a similar composition to periodontal connective tissue, human, porcine and bovine pericardium membranes, and human

acellular freeze-dried dermal matrix, or non-resorbable, such as dense polytetrafluoroethylene (d-PTFE), expanded PTFE, titanium mesh and titanium-reinforced PTFE.⁵ Although non-resorbable membranes are the most frequently used in vertical bone augmentation techniques, their exposure is the most common complication, having a detrimental effect on therapeutic success. For horizontal and vertical defects, both non-resorbable and resorbable membranes are used with similar success rates.⁵ In immediate implant placement, a review found evidence of an increased defect height reduction for the membrane-covered groups, despite a 2.52 rate higher rate of complications.⁶ A systematic review found that the mean vertical bone gain when GBR was followed by membrane exposure without suppuration was only 65% that of sites without membrane exposure.⁷ The overall incidence of healing complications at the augmented site at the site level was 11.0%, and the site-level incidence of membrane exposure without suppuration was 8.7%.⁷ Also, membrane exposure after GBR procedures results in 74% less horizontal bone gain compared with sites without membrane exposure. In peri-implant dehiscence de-

fects, sites with membrane exposure had 27% less defect regeneration compared with sites without exposure.⁸

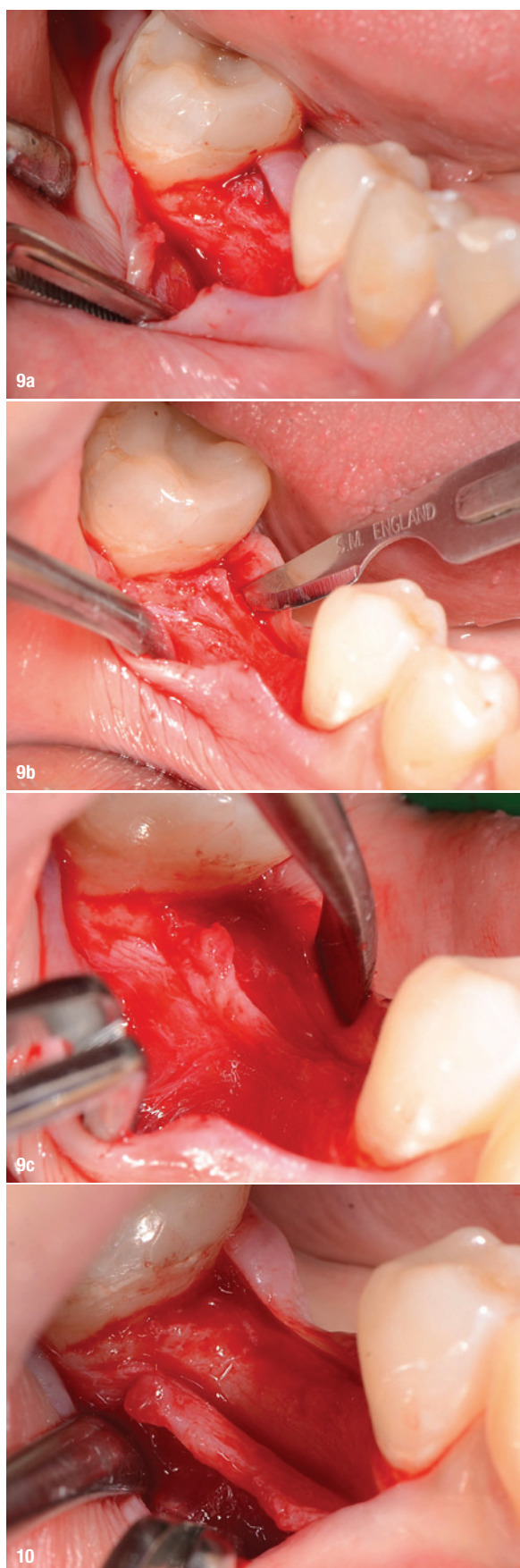
All these membranes possess certain shortcomings and limitations in the restoration of alveolar bone defects, stopping the progression of bone resorption but failing in the complete regeneration of bone defects.⁹ Moreover, the greatest limitation of commercial GBR membranes is their occlusive feature that excludes soft-tissue ingrowth and blocks the inflow of the endogenous resources.¹⁰

Bone healing is a complex process involving inflammation, repair and remodelling associated with intracellular signalling pathways regulating the regeneration of new bone tissue. Bone tissue engineering tools can be used to stimulate and accelerate the healing processes in the augmentation techniques of alveolar bone defects.¹¹ Mahajan considers that the potential of periosteum as a bone tissue engineering tool is highly underrated in the field of bone tissue regeneration in the oral and maxillo-facial area, despite its use as a regenerative tool in the general medical field.¹²⁻¹⁴ Moreover, periosteum-mimicking membranes^{15,16} and hydrogel biomimetic periosteum^{17,18} were proposed recently to accelerate bone fracture regeneration. The role of periosteum as a potential source of osteogenic cells, growth factors and blood is highlighted by a study that concluded that bone areas without periosteum are strongly compromised in contrast to areas with an intact periosteum.^{19,20} The possibility of using periosteum in the regeneration of resorbed alveolar bone is based on the osteogenic potential of its cells to regulate the outer shape of alveolar bone and to regulate cortical bone thickness as well as the size and position of the bone in space.²¹ Two studies have already established the potential of periosteum to stimulate periodontal regeneration and to rehabilitate lost periodontal tissue when used in the treatment of gingival recession defects.^{22,23} The formation of a pseudo-periosteum layer, as a mechanical barrier and a potential source of osteogenic agents, was highlighted in a study that investigated the use of titanium mesh to create the space necessary for the GBR technique.²⁴

The objective of this study is to present a novel surgical technique using adult human periosteum as a barrier membrane in a GBR technique used prior to implant placement in implant-supported prosthetic restoration of the mandibular posterior area. The periosteal membrane technique is described through a case report of a 35-year-old patient requiring implant-supported prosthetic therapy of the edentulous mandibular alveolar ridge with moderate horizontal resorption (Figs. 1+2).

Surgical technique

Anaesthesia was performed in the surgical area with articaine and 1:100,000 adrenaline (Ultracain, Normon Lab-



Figs. 9a–c: Sectioning the periosteum as lingually as possible. – **Fig. 10:** Sectioned periosteum.

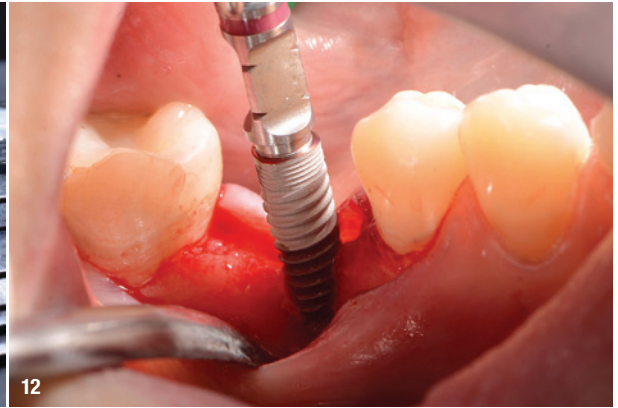
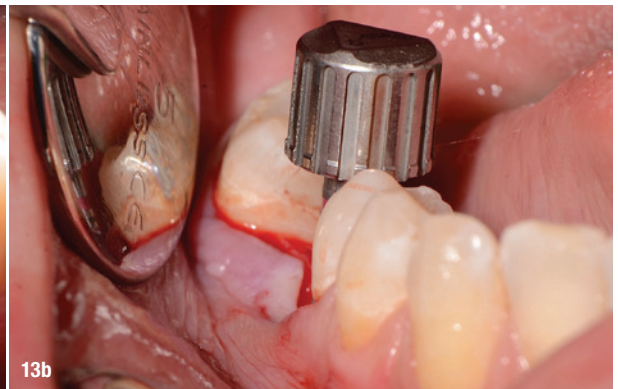
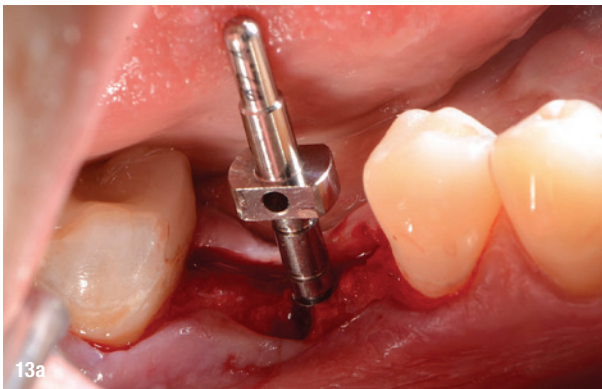


Fig. 11: Armamentarium for periosteum harvesting. – **Fig. 12:** Implant and abutment placement.



Figs. 13a+b: Checking the parallelism from different angles.

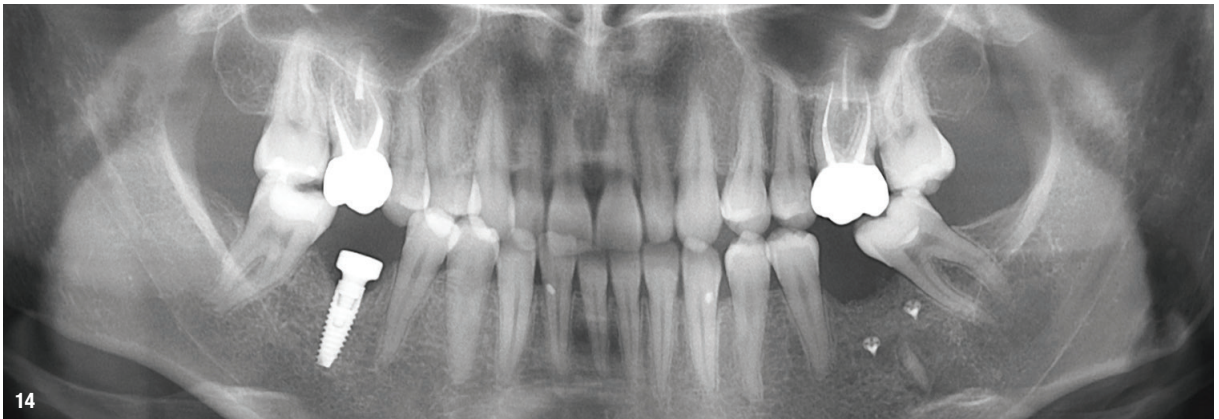


Fig. 14: Panoramic radiograph to confirm the implant position.

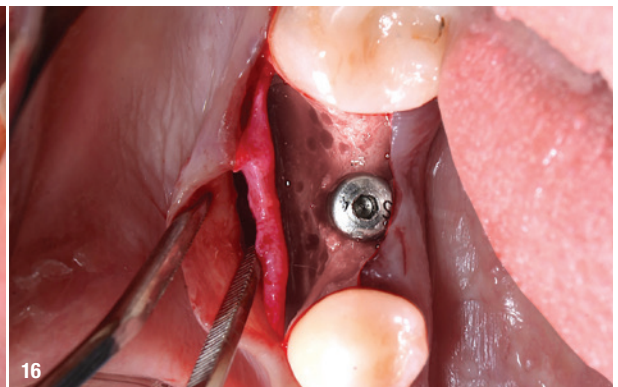


Fig. 15: Checking the implant placement according to biologic width. – **Fig. 16:** After implant placement.



Fig. 17: Augmentation material, autologous bone and xenograft granules.

oratories). A crestal incision was made without sectioning the periosteum (Fig. 3), the gingival height was measured (Fig. 4) and a split-thickness flap was elevated, starting from line of the incision (Fig. 5). The mucogingival junction was detached with a blunt instrument (Fig. 6), the buccal and lingual mucosa were detached with a splitting instrument (Figs. 7+8) and the periosteum was sectioned as lingually as possible (Figs. 9–11). The implant was placed

(Fig. 12), its parallelism was checked (Fig. 13), its location was confirmed radiographically (Fig. 14) and its placement according to biologic width was checked (Fig. 15). The site (Fig. 16) was augmented with autologous bone and xenograft granules (Geistlich Bio-Oss, Geistlich Pharma; Figs. 17+18). The periosteum was sutured without tension (Figs. 19+20).

The patient was instructed to rinse twice daily with a 0.12% chlorhexidine mouthrinse for two weeks and to avoid mechanical hygiene on the operated area. Antibiotic therapy (amoxicillin and clavulanic acid) and anti-inflammatory therapy (400mg ibuprofen every eight hours) were prescribed for seven days. The patient reported no discomfort or postoperative pain. The sutures were removed two weeks later. At the visit, an incision was made for an individualised healing abutment, and it was inserted (Fig. 21).

Clinical and CBCT measurements

Control visits took place at two days (Fig. 22), 30 days, four months (Fig. 23), 12 months (Fig. 24) and 36 months postoperatively (Figs. 25–27). Every control session con-

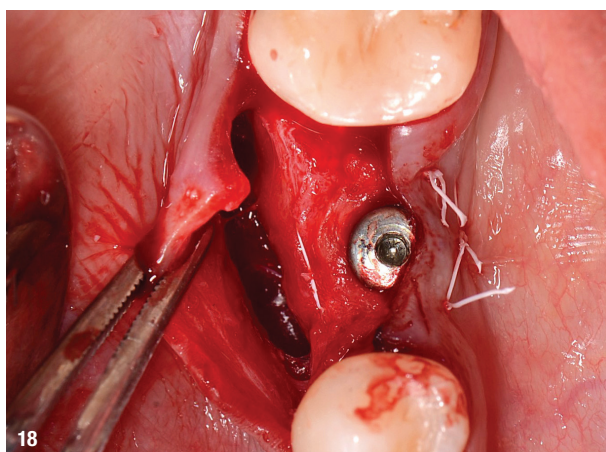


Fig. 18: Alveolar bone augmentation. – **Fig. 19:** Suture of the periosteum on the lingual aspect.

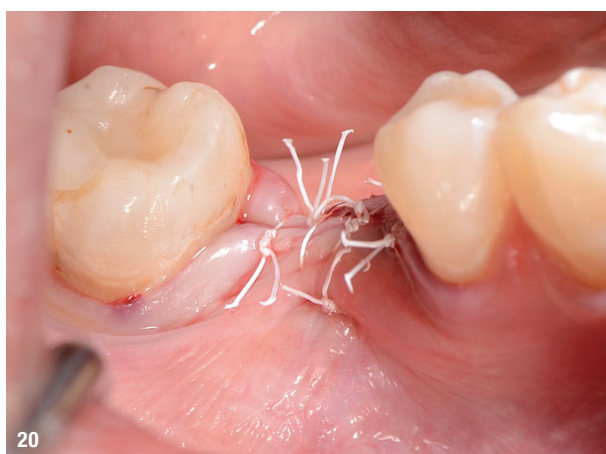
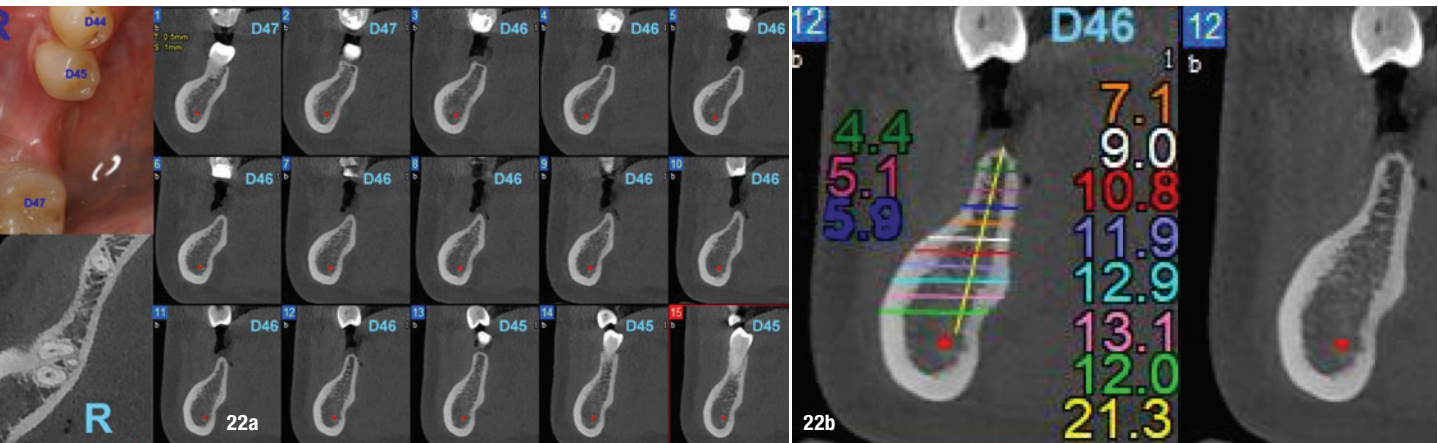


Fig. 20: Final suture without tension. – **Fig. 21:** Insertion of the individualised healing abutment.



Figs. 22a+b: Comparison between the radiographs taken pre-op (a) and two days post-op (b).

sisted of a clinical examination during which the Modified Plaque Index, Modified Gingival Index, peri-implant probing depth and keratinised mucosa were measured. Each clinical examination found a healthy peri-implant status: a Modified Plaque Index of 0, a Turesky Modification of the Quigley-Hein Plaque Index of 0, a peri-implant probing depth of ≤ 3 mm and keratinised mucosa of ≥ 2 mm.

The alveolar bone width was measured preoperatively, at two days postoperatively and at 36 months postoperatively on CBCT images with OnDemand 3D (CyberMed Inc.). The alveolar bone width values were 4.4 mm preoperatively, 10.4 mm at two days postoperatively and 9.1 mm at 36 months postoperatively, representing an alveolar bone width gain of 4.7 mm (Fig. 28).

Discussion

Despite the use of periosteum in the regeneration of bone in general medicine and the suggestion by several research groups to use periosteum as a barrier membrane in periodontal and alveolar bone regeneration,^{19,22,23,25}

there is a scarcity of studies focusing on long-term results to establish an effective standard protocol for using periosteal grafts as barrier membranes. Periosteal cells can be harvested from adjacent bone surfaces and can be stimulated to increase the progenitor cells of fibroblasts and osteoblasts at higher rates compared with bone marrow-, cortical bone- or trabecular bone-derived progenitor cells.²⁶ These periosteum-derived progenitor cells will differentiate into alveolar bone and thus will act synergically with both other periosteum-derived osteogenic agents and local natural processes involved in the regeneration of the alveolar bone. Thus, periosteum can be considered a barrier membrane for both periodontal surgery procedures and the pre-implantation surgical stage.²⁷

This case report has presented the treatment of an edentulous patient with moderate mandibular alveolar bone resorption requiring a GBR procedure for restoration of the bone. Immediate implant placement was performed in the same session as the surgical pre-implantation procedure. The success of the augmentation technique, con-



Fig. 23: Clinical aspect at four months postoperatively. – **Fig. 24:** Clinical aspect at 12 months post-op.

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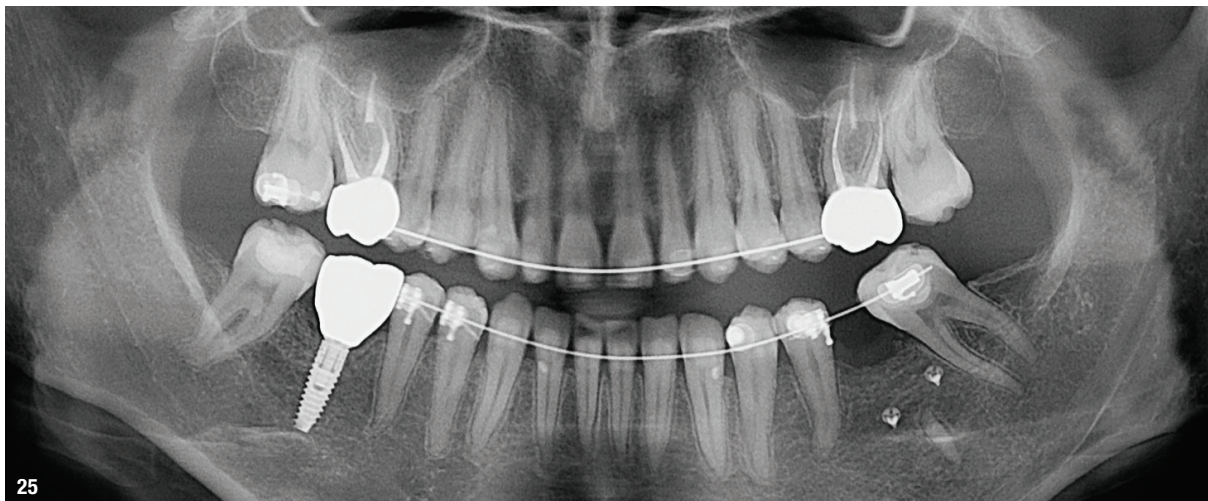


Fig. 25: Panoramic radiograph at 36 months post-op.

sisting of combination of autogenous bone and xenograft biomaterials and periosteum as a barrier membrane, was proved by bone width gains (4.7 mm) at 36 months post-operatively as well as by the absence of biological complications in the peri-implant area. The result is similar to findings reported by studies focused on horizontal bone augmentation employing the GBR technique using autogenous bone in combination with xenografts and bioresorbable membranes. Collagen membranes achieved width gains of 5.60 ± 1.35 mm,²⁸ 4.44 mm²⁹ and 3.23–4.93 mm,³⁰ and polymeric membranes had width gains of 3.95 mm.³¹

Autogenous bone is considered the gold standard of grafting materials owing to its osteogenic activity, supplying bone-enhancing substrates and vital bone cells to the recipient site.¹⁹ The addition of xenograft material is due to an insufficient amount of autogenous bone and the properties of xenogeneic materials (i.e. inert osteoconductive filler materials serving as a scaffold for the forma-

tion of new bone).¹⁹ Bioresorbable membranes (mostly collagen) are placed in direct contact with the surrounding bone surface, creating a space where only cells from the neighbouring bone or bone marrow will migrate into bone defects and avoiding the proliferation of the competing soft-tissue cells from the overlying mucosa, mechanical disruption and salivary contamination. The benefits of bioresorbable membranes are biocompatibility, tissue adhesion without mobility and blocking of soft-tissue ingrowth.¹⁹ The disadvantages of collagen bioresorbable membranes are related to their lack of space-making ability (compensated for by their use with bone grafts or tenting techniques to prevent space collapse) and their fast degradation that reduces their effectiveness when used as physical barriers beyond one month.³²

The technique presented in this case report supports the need of implantologists and oral surgeons for a membrane with the potential to stimulate the healing and regenerative processes (owing to blood supply and osteo-



Fig. 26: Final result. – **Fig. 27:** Clinical aspect at 36 months post-op.

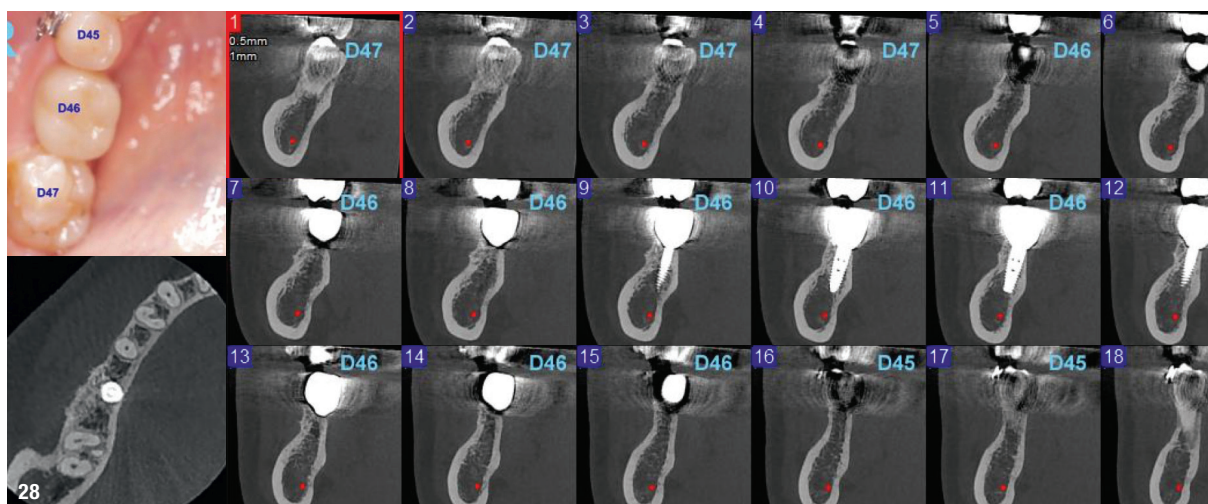


Fig. 28: Clinical aspect and CBCT measurements at 36 months post-op.

genic agents) and that can be harvested during the same routine oral surgery session, near to the alveolar bone defect and in the desired amount.^{27,33} The human periosteum is such a membrane owing to its content of fibroblasts, osteoblasts and stem cells as well as high vascularity.²⁷ The clinical success reported in this case report can also be attributed to the progenitor cells of fibroblasts and osteoblasts in periosteum that have the ability to grow and differentiate into multiple mesenchymal lineages that sustain the regeneration of new bone tissue.²⁷ Well-designed research comparing GBR techniques using either resorbable membranes or periosteal membranes in association with the same grafting biomaterials is recommended in sufficiently large sample sizes to validate and support the routine use of periosteum as a barrier membrane in implant therapy.

Conclusion

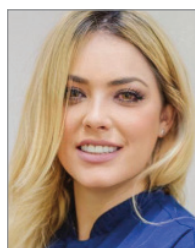
The use of periosteum can increase the success rate of GBR procedures in the restoration of severely resorbed alveolar bone for the receipt of dental implants. Despite the lack of data that supports the use of periosteal grafts as a standard tool in the pre-implantation stage, this case report has demonstrated the regenerative potential of periosteum when used in the reconstruction of future implant sites.

about the authors



Dr Cosmin Dima graduated in dentistry from the Carol Davila University of Medicine and Pharmacy in Bucharest in Romania in 2001, was certified in implantology in 2004 and completed his PhD in surgery on the topic of bone regeneration around implants in 2019. He is the managing director of the Dental Progress clinic in Bucharest. He developed the Snake technique and

the periosteal membrane technique for bone augmentation. Dr Dima is co-founder and educational director of the Digital Dentistry Society in Romania and a member of the Society of Esthetic Dentistry in Romania, European Society of Cosmetic Dentistry and International Congress of Oral Implantologists. In 2020, he received the World's Top 100 Doctors in Dentistry lifetime achievement award from the Global Summits Institute.



Dr Iulia Florea is a passionate and dynamic dental professional with a commitment to serving others through best practices and superior care and has over ten years of experience in general practice since graduating in dentistry from the Carol Davila University of Medicine and Pharmacy in Bucharest in Romania in 2012. Dr Florea is adept in planning and implementing

appropriate and powerful patient care plans, leading to optimal results, and has a great passion for dental photography. She is in private practice at the Dental Progress clinic in Bucharest.



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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





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



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!



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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The global dental industry gathers in Cologne

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The 41st International Dental Show (IDS) will take place in Cologne from 25 to 29 March, once again reaffirming its status as the world's premier trade fair for dentistry and dental technology. Organised by GFDI (Society for the Promotion of the Dental Industry) and hosted by Koelnmesse, IDS serves as the global hub for dental professionals, dental technicians, industry leaders, and the dental trade.

As the industry's leading event, IDS offers an unparalleled platform for innovation, networking, and knowledge exchange, shaping the future of dentistry worldwide.

Strong global demand: IDS remains the premier event for the dental Industry

In partnership with the Association of the German Dental Industry (VDDI), Koelnmesse has further expanded the international reach of IDS in recent years. Targeted marketing and sales initiatives—particularly in South America, Asia, and the USA—have reinforced IDS's position as the world's leading dental trade fair.

With around 2,000 exhibitors from over 60 countries and an international participation rate of 77 per cent, IDS 2025 underscores its strong global orientation. The largest exhibitor delegations are expected from South Korea, Italy, the USA, China, Turkey, Spain, France, and Switzerland, alongside numerous country pavilions representing all continents. The high demand from both domestic and international participants highlights IDS's critical role in driving innovation, shaping market trends, and facilitating global business, making it an indispensable platform for industry leaders.

IDS also remains a major global attraction for visitors. In 2023, approximately 120,000 trade visitors from 122 countries attended, and IDS 2025 aims to surpass this milestone.

To ensure an efficient and seamless trade fair experience, IDS 2025 features an optimised hall layout with four entrances and an expansive 180,000 square metres

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Pressing issues such as talent development, the skilled labor shortage, sustainability, and the integration of artificial intelligence take center stage. Through initiatives like the Executive Summit and the digital platform IDS-connect, IDS is creating new avenues for networking, knowledge exchange, and innovation.

Launching online in early March 2025, IDSconnect will provide a wealth of digital content, including seminars, corporate presentations, and learning sessions—seamlessly complementing the in-person trade fair experience. By integrating both physical and digital formats, IDS is redefining the future of industry exhibitions.

With a unique blend of tradition and innovation, enriched by international diversity and forward-thinking themes, IDS 2025 is setting new benchmarks for the dental and trade fair industries alike.

of exhibition space. Visitors will benefit from a comprehensive suite of services, including personalised digital tickets, which also serve as public transport passes, as well as exclusive travel offers from Deutsche Bahn and Lufthansa.

A trade fair in evolution

While product presentations remain a cornerstone, IDS has evolved into much more than a mere showcase. It now functions as a dynamic platform, fostering industry-wide dialogue and collaboration on key sector challenges.

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Focus on science and practice

3rd European Congress for Ceramic Implantology, Switzerland

Only the facts matter: Under the theme “Facts of Ceramic Implants Part III,” the European Society for Ceramic Implantology (ESCI) invites clinicians, implantologists, and researchers to the highly anticipated third edition of this prestigious event. The 3rd European Congress for Ceramic Implantology will take place from 25 to 27 September 2025, in Horgen/Zurich, Switzerland, offering a premier platform for the exchange of cutting-edge scientific advancements and clinical breakthroughs in ceramic implantology.

A world-class programme featuring renowned experts

Over three dynamic days, attendees will gain invaluable insights from 27 globally recognised speakers, who will present pioneering research, innovative treatment approaches, and real-world clinical experiences. The programme is structured around three core themes: material

science, biological integration, and clinical application. Topics will range from the fundamentals of ceramic implantology to advanced techniques and interdisciplinary methodologies, equipping both researchers and clinicians with essential knowledge.

Pre-congress workshops: Hands-on learning at its best

Participants will have the opportunity to refine their expertise through specialised, practice-oriented workshops led by world-renowned experts. These sessions will focus on surgical techniques, emerging treatment modalities, and best practices for seamlessly integrating ceramic implants into daily clinical practice. A highlight of the event is the exclusive ESCI Pre-Congress Workshop, developed in collaboration with the Centre for Dental Medicine at the University of Zurich. This unique session provides hands-on training with three different

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PART III **FACTS of** **CERAMIC** **Implants**
 25.-27.Sept. 2025
 Zurich-Switzerland



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implant systems, featuring live surgeries and practical exercises—an unparalleled educational experience found nowhere else in the world.

The prestigious ESCI Award

The ESCI is proud to offer its members the opportunity to showcase their clinical expertise through case presentations. The ESCI Scientific Advisory Board will honor the best submission with the ESCI Award, valued at CHF1,000. The recipient will also be invited to present their case during the congress, providing well-deserved recognition for their outstanding work.

Networking in an inspiring atmosphere

Beyond its scientific excellence, the congress fosters meaningful connections in a warm and engaging setting. The Welcome Reception, held in the historic wine cellar of Landgut Bocken, provides a perfect environment for networking and exchanging ideas. The Swiss Gala Dinner, themed “60 Years of Implantology,” will be a social highlight, hosted at the picturesque Bocken Estate on the shores of Lake Zurich. This special evening commemorates the 60th anniversary of the first dental implant placed by Per-Ingvar Brånemark, featuring a keynote address by his close collaborator, Prof. Tomas Albrektsson. Attendees will also enjoy a delightful showcase of Swiss culture, complemented by exquisite cuisine and a captivating entertainment programme.

A perfect blend of innovation and tradition

Zurich serves as an ideal backdrop for this congress, seamlessly merging scientific rigor with Swiss hospitality. Attendees will not only benefit from groundbreaking presentations but also have the chance to explore the city’s rich cultural and culinary heritage.

With its unique combination of pioneering science, hands-on learning, and cultural immersion, the 3rd European Congress of Ceramic Implantology is set to redefine standards in the field. Recognised as the world’s largest and most influential event for zirconia implantology, this congress is an unmissable occasion.

We look forward to welcoming you!

contact

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 www.esci-online.com/congress





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World's leading congress in **perio-** **dontology** and **implant dentistry**

EuroPerio11, Austria

EuroPerio11 isn't just the premier event in periodontology and implant dentistry, it's an unmatched opportunity to explore the latest scientific developments, innovative treatments, and important connections between oral health and overall health. Whether you cover health, science, or technology, EuroPerio11 will provide fresh, newsworthy content for your audience.

This most important global gathering for periodontology and implant dentistry event will take place from 14 to 17 May 2025 at Messe Wien in Vienna, Austria. Hosted by the European Federation of Periodontology (EFP), EuroPerio is renowned for its cutting-edge scientific presentations, lively debates, networking opportunities and comprehensive exhibition of the latest dental innovations.

Why gum health matters

Periodontal disease and oral health issues continue to make headlines due to their widespread impact and links to systemic conditions such as diabetes and heart disease. EuroPerio11 provides an unrivalled opportunity to learn about the latest advances in prevention and management, making it a key event for journalists looking to cover breakthroughs in health, technology, and patient care.

What's new and exciting at EuroPerio11

- **Latest innovations in periodontal care:** discover pioneering research, with more than 155 speakers from 34 countries, sharing the most up-to-date clinical



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data and discussing emerging trends in periodontology and implant dentistry.

- **Artificial intelligence (AI) and dentistry:** EuroPerio11 will showcase how AI is transforming dental diagnostics and treatment planning, opening exciting new avenues for both clinicians and researchers. Don't miss the AI in Dentistry session, offering plenty of story ideas for tech and healthcare reporters alike.
- **Live surgeries and interactive sessions:** attendees will have a front-row seat to three live surgeries, conducted by world-leading clinicians, demonstrating cutting-edge techniques and technologies in real-time. These sessions provide a rare opportunity to see leading experts in action, helping to bring clinical stories to life for your readers.
- **Gut microbiome research and periodontitis:** in the intriguing session "Bottoms up! What can we learn from gut microbiome research to benefit periodontitis patients?" experts will dive into the latest findings on the gut-oral health connection. This cutting-edge research reveals how gut microbiota may influence periodontal disease, with potential new strategies for managing periodontitis.
- **Patient-centred sessions:** a major focus this year is on patient-centric care, a growing trend in healthcare. Special sessions will explore how dentists are adapting their practices to be more attuned to the needs and preferences of patients and ensure adherence to recommendations.
- **Spotlight on women's oral health:** For the first time, EuroPerio will host a dedicated session on women's oral health, addressing the specific challenges and advances in the field, including hormonal influences and unique dental care needs. This session provides new perspectives for coverage on gender and health and calls for more research in this area.
- **Systemic connections:** EuroPerio11 will spotlight research that links periodontal health to systemic diseases such as cardiovascular disease and diabetes. This comprehensive, whole-body approach opens fresh story angles on how oral health impacts overall well-being. A session on gum disease and diabetes will draw on the latest evidence connecting these chronic conditions and point to new ways of improving patient outcomes.

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European Federation of Periodontology (EFP)

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Are you a writer?

Do you have clinical cases and a profound knowledge about a special treatment method? Then become part of **implants—international magazine of oral implantology**. Share your experience and knowledge and benefit from a global reach and high level of awareness.

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Send us a text with length of 10,000 to 15,000 characters. We do not want to limit you in terms of article length, so please use the word count as a general guideline!



Numbered images in TIF or JPEG format, in a printable quality of at least 300 dpi.



Most important: we would like to introduce you/the mind behind the article. So please send us also your portrait photo with a short biography about your professional career and your contact information.



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Shaping the future of ceramic **implantology**



4th Annual Congress of EACim, Spain

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The European Academy for Ceramic Implantology (EACim) proudly announces its 4th Annual Congress, set to take place in the dynamic and culturally rich city of Madrid on 13 and 14 June 2025. This highly anticipated event will once again bring together pioneers, innovators, and leading voices in advanced ceramic implantology for two transformative days of cutting-edge science, groundbreaking research, and meaningful collaboration.

At the forefront of this year’s congress is the rapidly evolving field of metal-free implantology. Renowned international experts will take the stage to share their insights, unveiling the latest scientific breakthroughs, innovative techniques, and forward-thinking approaches that are shaping the future of implant dentistry. Attendees will gain comprehensive, up-to-date knowledge on this grow-

ing field, ensuring they stay ahead in an industry that is constantly advancing.

Beyond knowledge: An immersive experience in innovation and collaboration

However, EACim 2025 is more than just a platform for knowledge transfer—it is an immersive, hands-on experience designed to foster innovation, spark discussions, and transform patient care. Participants will have the opportunity to engage in practical workshops, live demonstrations, and interactive sessions, allowing them to refine their skills, explore new treatment solutions, and exchange ideas with leading professionals and like-minded peers. The congress will serve as a collaborative think tank, where experts and attendees work together to redefine best practices and drive the next generation of implantology.

Madrid, a city that seamlessly blends tradition and modernity, provides the ideal backdrop for this exceptional event. Between sessions, delegates can explore world-renowned museums, historic landmarks, and a thriving culinary scene, ensuring an experience that is as enriching outside the congress as it is within.

Join us and be part of the future

Whether you are a seasoned professional, a forward-thinking researcher, or an ambitious clinician eager to expand your expertise, the EACim Congress 2025 is your gateway to the future of ceramic implantology. This is where innovation meets practice, where ideas are exchanged, and where the evolution of implant dentistry takes form.



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www.eacim-ceramic-implantology.com



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Camlog

Closing a chapter, opening new doors: Farewell to Ingrid Strobel



At the end of March, Ingrid Strobel, Manager of Public Relations at CAMLOG Vertriebs GmbH, bid farewell to her well-earned retirement after an impressive career spanning nearly 48 years.

Her journey began in 1977 with vocational training as a dental technician, followed by years in practice laboratories, where she developed in-depth expertise in aesthetics, patient needs, and overall well-being. She spent a decade working in the renowned laboratory of Peter Biekert in Stuttgart, where she contributed to testing and refining Willi Geller's ceramic materials. Geller, a visionary and perfectionist in dental aesthetics, became her role model. For Ingrid Strobel, close collaboration between dentists and dental technicians at the treatment chair was always of paramount importance.

Her first experience with implant restorations came in the early 1990s, marking the start of a deep and lasting connection to implantology. She continuously expanded her knowledge through numerous congresses and valuable discussions with dentists and industry experts.

Under the guidance of her then-mentor, Dr Ady Palti, she was given the opportunity to participate in national and international courses, presenting implant prosthetics to a wider audience. Dr Palti was an early advocate for the crucial role of dental laboratories in the long-term success of implants and encouraged her to transition into the industry.

From 2002 to 2013, Ingrid Strobel worked as a technical consultant for various companies, already gaining experience in crafting German-language product manuals and marketing materials for international markets. In 2013, she joined Camlog as Manager of Public Relations, a role in which she felt she had truly "arrived". She often highlighted Camlog's strong team spirit and the company's culture of fostering and challenging its employees, making professional growth a rewarding experience.

Initially responsible for media planning and specialist press relations, her role expanded significantly into medical writing. She takes particular pride in the two casebooks she helped develop for BioHorizons Camlog products.

For the editorial team of *Implantologie Journal*, Ingrid Strobel has been a valued and reliable partner, and for that, we extend our deepest gratitude.

After nearly five decades dedicated to dentistry, she now looks forward to immersing herself in her passions—woodworking, gardening, and advocating for environmental and landscape conservation.

Dear Ingrid, we wish you all the best for this new chapter!

The team at *implants* magazine

CleanImplant Foundation

Advancing implant safety and quality:

The role of CleanImplant in a changing regulatory landscape

Dental implantology has seen remarkable advancements over the past decades, improving patient outcomes and expanding treatment possibilities. However, with innovation comes the critical responsibility of ensuring implant safety, biocompatibility, and quality. Regulatory frameworks such as the US Food and Drug Administration (FDA) and the European Medical Device Regulation (MDR) establish stringent requirements for implant manufacturers, influencing how implants are designed, tested, and marketed. In this landscape, CleanImplant has emerged as a vital mediator, bridging the gap between patient care, scientific research, and industry collaboration.

The regulatory landscape for dental implants

The FDA's regulatory process for medical devices, including dental implants, involves various submission pathways, with the 510(k) premarket notification being one of the most common. The recent updates to the FDA 510(k) guidance now recommend advanced analytical techniques such as scanning electron microscopy (SEM) and energy-dispersive spectroscopy (EDS) to evaluate particulate contamination on implant surfaces. These measures aim to enhance patient safety by ensuring higher purity standards and reducing the risk of adverse immune responses or implant failure.

In parallel, the European MDR has imposed stricter controls on medical devices, including more comprehensive clinical evidence requirements, increased post-market surveillance, and higher accountability for manufacturers. As a result, manufacturers must now provide more extensive documentation and independent assessments to demonstrate compliance with safety and performance standards.

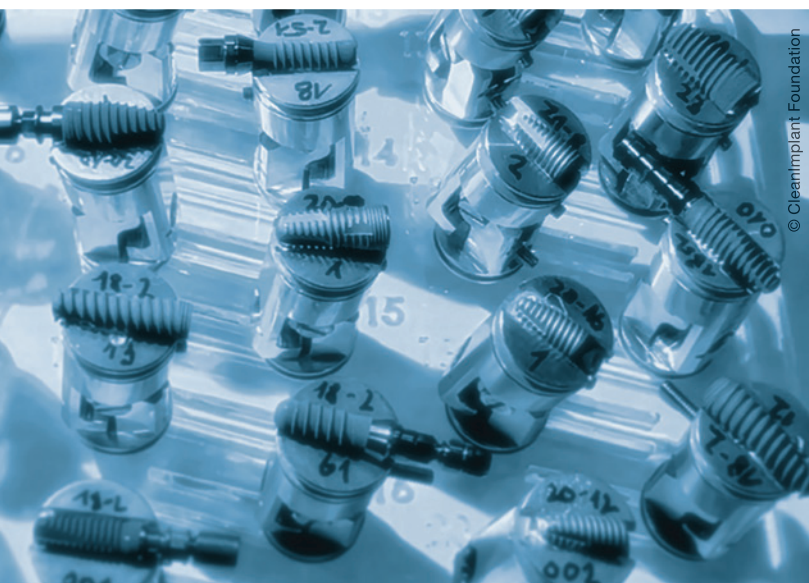


Fig. 2: Implant samples mounted for SEM inspection (medical materials research institute).

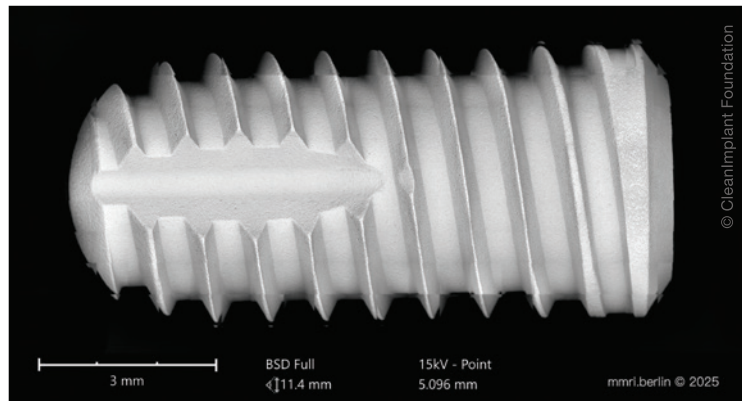


Fig. 1: Example of a particle-free dental implant in the scanning electron microscope (high-resolution SEM mapping image electronically compiled of up to 400 single SEM frames).

CleanImplant: a catalyst for transparency and quality assurance

Recognising the growing concerns about factory-related implant contamination and quality inconsistencies, the CleanImplant Foundation has taken a proactive role in independently assessing and verifying implant cleanliness. By conducting rigorous scientific evaluations using state-of-the-art methodologies, CleanImplant provides objective, transparent data to ensure that dental professionals and patients can make informed decisions about implant selection. Commissioned by the CleanImplant Foundation, quality assessment studies on hundreds of dental implant systems used exactly the analytical techniques that the FDA now recommends identifying impurities.

Particulate contaminants as found repeatedly on new, sterile packaged implants, can trigger immune responses leading to peri-implantitis, soft- and hard-tissue degradation and, ultimately, implant failure. Collaborative research with institutions such as the University of Zurich further highlights the impact of surface contamination on cell viability, reinforcing the need for stringent quality standards.

A collaborative approach for better patient care

Beyond its role as an independent institution for dental implant quality assurance, the non-profit organisation has evolved into a platform that unites stakeholders across the dental implant industry. The initiative fosters collaboration between manufacturers, researchers, and clinicians, ensuring that advancements in implant technology align with patient safety and regulatory expectations. With the introduction of the new platform CleanImplant 4 Me, the Directory for patients serves as a bridge, connecting certified clinics with individuals seeking reliable, certified implant solutions. By creating a network of trusted providers, CleanImplant enhances the accessibility of superior implant treatments while encouraging manufacturers to meet elevated quality benchmarks.

Furthermore, industry support for CleanImplant has grown significantly over the past years, reflecting a shared commitment to transparency and patient well-being. As regulatory requirements become increasingly stringent, manufacturers partnering with CleanImplant can proactively reinforce their credibility and commitment to excellence.

The dental implant industry is undergoing a significant transformation, driven by regulatory changes, scientific advancements,

“Beyond its role as an independent institution for dental implant quality assurance, the non-profit organisation has evolved into a platform that unites stakeholders across the dental implant industry.”

and growing patient awareness. At the same time, we are navigating an era of global uncertainty, where socioeconomic shifts and evolving political landscapes demand greater transparency and accountability. In such times, credibility and collaboration become essential fundamentals for progress. CleanImplant plays a crucial role in fostering this trust by providing independent assessments, facilitating industry dialogue, and advocating for higher standards in patient care by reinforcing transparency and scientific integrity—verified & peer-reviewed.

More information is available on the project’s website www.cleanimplant.org or meet the experts during the IDS 2025 in Cologne (Hall 4.1, Booth C080/D081).



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Digitally networked implant treatment



Take advantage of the current savings packages in the Get it! campaign:



NSK has developed and improved the Surgic Pro surgical micromotor system, which is now available as Surgic Pro2. Surgic Pro2 provides a Bluetooth connection to the Osseo 100+ osseo-integration gauge and a Link Set connection to the VarioSurg3 ultrasonic surgical system. By installing an application and connecting an iPad to the control unit, detailed intervention data can be displayed in real time. Both Surgic Pro2 treatment parameters and Osseo 100+ data can be displayed and stored on the iPad. The traceability of patient-specific treatment data means that implant treatment can be customised for each patient. The Surgic Pro2 and VarioSurg3 can be operated wirelessly and hygienically using a common foot control. But even without connection to other units, Surgic Pro2 offers advantages for the practitioner. The micromotor is short, lightweight and ergonomic. A high-resolution LED in the micromotor serves as light source to match working conditions under full daylight. The pump module is quiet, and the irrigation tube is easy to attach. The Surgic Pro2 is simple and intuitive to use, making it easy to upgrade from the previous model to Surgic Pro2.

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breident medical

High primary stability and aesthetic appearance

The whiteSKY implant system from breident is among the best-documented zirconia implant systems worldwide. It has not only demonstrated excellent osseointegration and longevity in numerous studies but has also proven its efficacy in practice. In fact, the longevity of whiteSKY implants is comparable to that of titanium implants. The whiteSKY implant system offers two different implant types: the whiteSKY Tissue Line and the whiteSKY Alveo Line. The narrow whiteSKY Tissue Line implant provides sufficient space for both the hard and soft tissue and ensures an aesthetically pleasing appearance with its slightly tapered shape in the sulcus area, transitioning from the gingiva to the implant crown. The whiteSKY Alveo Line, on the other hand, is ideal for immediate loading as it fills the extraction socket. At the same time, it provides the treating doctor with the possibility to individualise the implant according to the specific requirements of the clinical case.

Optimal conditions for soft-tissue attachment and high mechanical stability

Both the Alveo and Tissue Line implants of the whiteSKY system offer optimal conditions for soft-tissue attachment due to their specially designed sulcus surface. The whiteSKY implants are made of hardened zirconia and are one-piece, which gives them particularly high mechanical stability. Thanks to the improved thread design and bone-quality-oriented surgical protocol, the whiteSKY implants achieve high primary stability, making them ideal for immediate loading. Studies have shown that immediate implant placement can improve the bone—implant contact by more than 50 per cent.



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MEDENCY

A game-changer in implant care: Radial decontamination protocol (RDP)

Peri-implant diseases, such as mucositis and peri-implantitis, present significant challenges in modern dentistry. 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. Designed for bacterial decontamination and tissue regeneration, RDP provides an effective, minimally invasive, and patient-friendly approach to improving implant longevity.

What is RDP?

RDP integrates laser-assisted full-mouth disinfection with radial laser emission to effectively eliminate biofilm, reduce inflammation, and stimulate soft-tissue healing. By leveraging MEDENCY's specialised laser accessories, clinicians can apply RDP across preoperative, intra-operative, and postoperative stages for comprehensive implant care.

How RDP works

RDP is a structured, four-step approach ensuring standardised, effective implant maintenance:

1. **Patient evaluation**—Clinical assessment and implant site analysis.
2. **Treatment planning**—Selection of optimal laser parameters for individual needs.
3. **Laser-assisted decontamination**—Targeted bacterial removal and soft-tissue biostimulation.
4. **Follow-up & maintenance**—Post-treatment strategies for long-term success.

Backed by science

Clinical research highlights diode lasers' ability to penetrate bacterial biofilms, disrupt microbial colonies, and promote soft-tissue regeneration. Laser-assisted peri-implant therapy offers superior decontamination compared to traditional mechanical methods, making RDP a scientifically validated and clinically reliable solution.

The future of laser-assisted implant therapy

MEDENCY's TRIPLO multi-wavelength laser enhances peri-implant treatments with three powerful wavelengths:

- **450 nm (Blue Laser)**—Faster debriment and coagulation.
- **635 nm (Red Laser)**—Photobiomodulation (PBM) for improved healing and inflammation control.
- **980 nm (Infrared Laser)**—Deep bacterial decontamination and enhanced peri-implant tissue health.



With its wireless operation, intuitive interface, and customisable settings, TRIPLO ensures precision, efficiency, and superior treatment outcomes.

Key benefits of RDP

- **Complete bacterial decontamination**—Effectively removes biofilm from implant surfaces and tissues.
- **Inflammation reduction**—Promotes faster healing with controlled soft-tissue inflammation.
- **Enhanced tissue regeneration**—Stimulates cellular activity, reducing postoperative complications.
- **Minimally invasive & painless**—Ensures patient comfort with reduced trauma and quick recovery.
- **Customisable for different cases**—Adaptable to every stage of implant therapy.

Advancing implant care with innovation

RDP sets a new standard in implant maintenance, delivering a minimally invasive, highly effective, and scientifically supported treatment method. As peri-implant diseases become more prevalent, integrating advanced diode laser solutions like RDP and TRIPLO empowers professionals to offer the best patient care.

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Congresses, courses and symposia



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EuroPerio11

14–17 May 2025
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www.efp.org



ITI Annual Global Conference

23–24 May 2025
Paris, France
www.iti.org



4th EACim congress

13–14 June 2025
Madrid, Spain
www.eacim-ceramic-implantology.com



FDI World Dental Congress

9–12 September 2025
Shanghai, China
www.fdiworlddental.org

implants

international magazine of oral implantology

Imprint

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Published by

OEMUS MEDIA AG
Holbeinstraße 29
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Printed by

Silber Druck GmbH & Co. KG
Otto-Hahn-Straße 25
34253 Lohfelden, Germany

implants—

international magazine of oral implantology is published in cooperation with the German Association of Dental Implantology (DGZI).

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CERAMIC IMPLANTS STATE OF THE ART

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