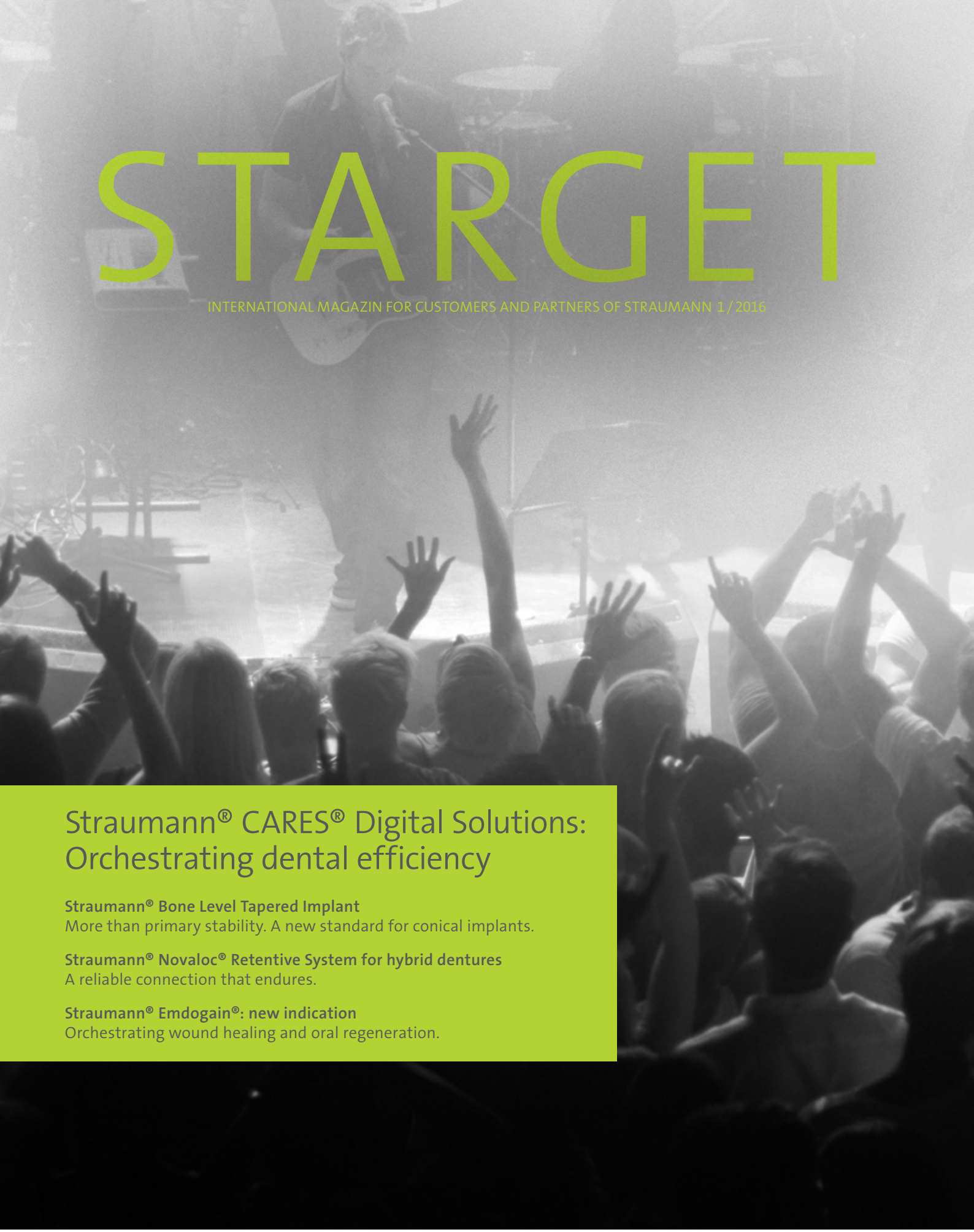

STARGET

INTERNATIONAL MAGAZIN FOR CUSTOMERS AND PARTNERS OF STRAUMANN 1/2016

Straumann® CARES® Digital Solutions: Orchestrating dental efficiency

Straumann® Bone Level Tapered Implant
More than primary stability. A new standard for conical implants.

Straumann® Novaloc® Retentive System for hybrid dentures
A reliable connection that endures.

Straumann® Emdogain®: new indication
Orchestrating wound healing and oral regeneration.

straumann
simply doing more

Imprint STARGET – INTERNATIONAL MAGAZINE FOR CUSTOMERS AND PARTNERS OF STRAUMANN | © Institut Straumann AG | Peter Merian-Weg 12 | CH-4002 Basel | Phone +41 (0)61 965 11 11 | Fax +41 (0)61 965 11 01 | **Editors** Roberto González, Mildred Loewen | **E-Mail** starget@straumann.com | **Web** starget.straumann.com | **Layout** BGA GmbH | www.bgagroup.net | **Printing** Hofmann Druck | www.hofmann-druck.de

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Editorial

Innovation and continuous development of existing knowledge

ANDREAS NITSCHKE
HEAD OF PRODUCT MANAGEMENT
DIGITAL

For our customers – dentists and dental laboratories - efficient workflows combined with maximum quality and precision are of utmost importance as crucial factors for success. This year, with our **Straumann® CARES® for dental labs and dentists** initiative, we are supplementing our portfolio with new or updated products, solutions and devices with key components. We want to give you the tools for keeping one step ahead in a highly competitive environment. These consist of an outstanding combination of selected hardware and software components and high-performance materials for a fully validated, digital workflow in the dental laboratory – a reliable, precise, efficient process tailored to your individual needs from scan to manufacture. With CARES® all your options remain open. **From S. 4**

Another exciting innovation was also launched in May this year: the abutment of the **Straumann® Novaloc® Retentive System for hybrid dentures** possesses an innovative, carbon-based coating to provide exceptional wear resistance in combination with the PEEK matrix. **From S. 52**

The **Straumann® Pro Arch®** solution and the **Straumann® Bone Level Tapered Implant** are increasingly becoming the treatment of choice in many clinics for full-arch restorations. The unique combination of treatment sequence, product design, material and surface technology, as well as good collaboration between operator, prosthetist and dental laboratory are the key factors for success here. In March a team of 15 Polish surgeons in Warsaw successfully treated over 20 edentulous patients with Pro Arch® and BLT during a 4-day clinical event. We were there. **From S. 30**

Last year **Straumann® Emdogain®** proudly celebrated its 20th anniversary. With over 2 million treated patients it has now become the standard in periodontal regeneration. We are now embarking on a new chapter in the history of this exciting product after it received approval, in March, for assisting wound healing in dental implantology. Straumann has thus become the first company to integrate a biological product as a an integral component in the surgical workflow for optimizing wound healing. **From S. 58**

As you have once again discovered in this new edition of STARGET, we are active on all fronts with our goal of advancing into new territory with new, innovative products and solutions – or the constant refinement of "classic" products. I hope you enjoy reading this edition.

Andreas Nitschke

Overview

STRAUMANN® CARES® – THE SOLUTION FOR DENTAL LABS AND DENTISTS

Straumann® is continuously evolving its product portfolio to match customer needs. Straumann® CARES® is the solution for dental laboratories looking to take advantage of seamless, digital workflows provided by an industry-leading partner.

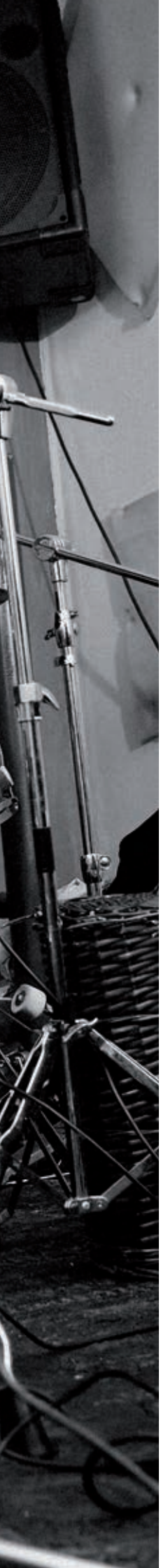
STRAUMANN® NOVALOC® RETENTIVE SYSTEM FOR HYBRID DENTURES

The Novaloc® Retentive System for hybrid dentures offers an innovative carbon-based abutment coating (amorphous diamond-like carbon) with excellent wear resistance, overcoming up to 60° implant divergence.

STRAUMANN® EMDOGAIN® FOR WOUND HEALING

We are setting new milestones in the area of oral tissue regeneration by extending the use of Emdogain® to improve soft tissue wound healing in oral surgical procedures and dental implantation procedures in general.

Content



Digital workflows for labs

Working together seamlessly

The Straumann® CARES® offering provides validated digital workflows for dental laboratories – from scan to manufacture. It includes a wide variety of premium materials, delivering a complete digital dentistry solution – reliable, precise and tailored to your needs.

Everything from one source – Straumann® CARES® tailors the digital workflow solution to your lab's needs:

- **In-Lab:** Straumann offers an in-house milling solution for creating added value for your dental laboratory.
- **Centralized:** Straumann's centralized milling facilities operate as an extension of your laboratory with state-of-the art equipment and validated workflows.
- **Connectivity:** Connect your existing Dental Wings, 3M Lava™, Exocad or 3Shape software and mill original Straumann® customized prosthetics without investing in additional hardware.
- Alternatively, you can use the **Straumann® Scan & Shape Service,** where we take care of the design and manufacturing of your restoration.
- **Materials:** Straumann's precisely milled, high-quality prosthetics cover a leading range of materials and applications for centralized or in-lab milling.

STRAUMANN® CARES® – THE SOLUTION FOR DENTAL LABS

Straumann® is continuously evolving its product portfolio to match customer needs. Straumann® CARES® is the solution for dental laboratories looking to take advantage of seamless, digital workflows provided by an industry-leading partner. Straumann® CARES® connects carefully selected, best-in-class dental equipment with the latest digital technology and premium materials to provide a seamless, fully validated workflow for the professional dental laboratory.

IN-LAB SYSTEM

Straumann® CARES® for dental labs and dentists

Validated digital workflows to make your life easier and results more predictable

Your benefits

OFFER A BROADER RANGE OF PROSTHETIC SOLUTIONS AND SERVICES

- Enjoy more freedom of choice: in-lab and/or central milling
- Expand the service offering of your lab
- Offer your customers a wider service portfolio

INCREASE PRODUCTIVITY AND EFFICIENCY

- Capitalize on efficient digital solutions to increase your cost-effectiveness
- Reduce complexity and the need to switch or migrate between different systems
- Increase accuracy, reduce milling times and ensure quality by using a validated streamlined workflow
- Optimized daily unit production

FUTURE-PROOF SOLUTIONS

- Ensure consistent manufacturing results
- Enjoy the reassurance of Straumann technical service and after sales support when you need it

SCANNING

Straumann® CARES® 3Series & 7Series
Capture clinical data in consistent, repeatable, high precision scans.

DESIGNING

Straumann® CARES® Visual
Communicate seamlessly from scan to manufacture.

IN-HOUSE MILLING
Straumann® CARES® M Series

SINTERING
Straumann® CARES® Therm
Straumann® CARES® Argotherm

CENTRALIZED MILLING

Straumann® CARES® CAD/CAM
Order customized, high quality restorations directly from our centralized milling centers.

MATERIALS

Straumann® CARES® Materials
An impressive portfolio of materials to support a broad range of treatment options, available for in-house and centralized milling.

Straumann® CARES® for dental labs and dentists

Straumann® CARES® – digital validated, streamlined workflows

Straumann® CARES® In-lab workflow

Straumann® centralized solutions

Straumann® CARES® CAD/CAM offers a unique portfolio of materials designed to provide you with a broad range of treatment options. All our dental materials can be processed, providing high versatility and giving you the options you need.

Straumann® CARES® for dental labs and dentists

Seamless communication from scan to manufacture.

Straumann® CARES® Visual software

Straumann® CARES® 7Series scanner

Straumann® CARES® 3Series scanner

STRAUMANN® CARES® SCANNERS

Capture clinical data in high-precision scans

In Straumann® CARES® 3Series and 7Series scanners, high scanning accuracy is ensured by utilizing the latest generation Blue Laser Illumination system with proven high-precision mechanical and optical components.

STRAUMANN® CARES® VISUAL

Digital design and transfer

Every Straumann® CARES® scanner is supplied with the fully integrated CARES® Visual software to enable the design of a wide range of prosthetic restorations followed by direct transfer to the milling solution of your choice; either in-lab or at a central milling center.

Straumann® CARES® M Series

Straumann® CARES® Therm furnace

Straumann® CARES® Argotherm furnace

STRAUMANN® CARES® M SERIES

Giving you more options for milling and grinding

The Straumann® CARES® M Series milling and grinding system enables dental laboratories to produce an extensive range of restorations for every type of indication. The flexible M Series can handle a wide range of materials. Allowing your lab to produce a broad range of prosthetics, from inlays, onlays, veneers, and single crowns, to bridges and screw-retained restorations. Prosthetics can be milled, or ground, in wet or dry modes from materials, including glass ceramic, zirconia, PMMA, cobalt-chromium – sintered metal, wax, lithium disilicate ceramics and resin nanoceramic.

STRAUMANN® CARES® HIGH-TEMPERATURE FURNACES

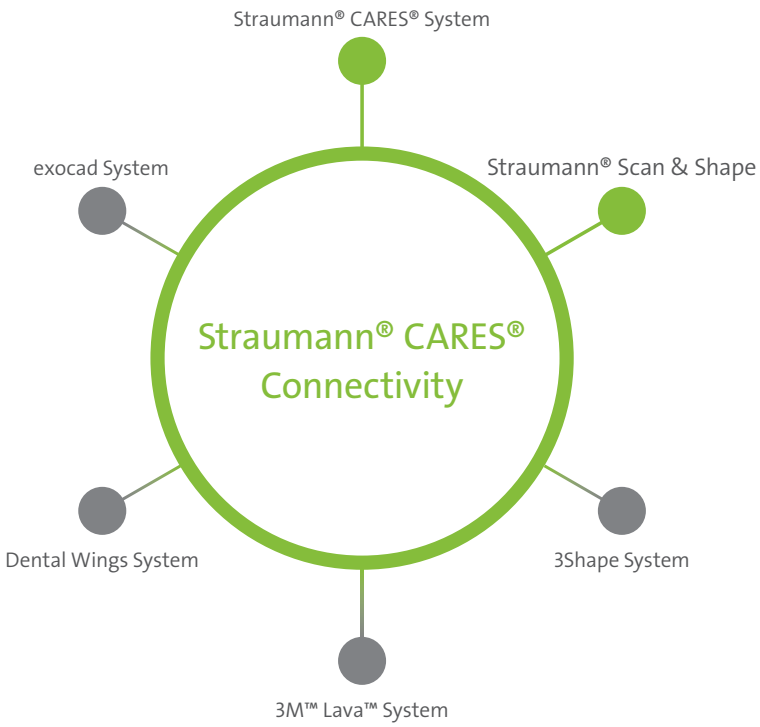
Constant temperature control and distribution

Straumann® high-temperature furnaces (Straumann® Therm for Zirconia and Straumann® Argotherm for Cobalt-Chromium) provide a variety of features combining easy operation and performance consistency. Space-saving designs with fully-automated, pre-programmed and customizable sintering programs make them ideal for the dental laboratory. Meet increased demand for zirconia and cobalt-chromium restorations.

Connectivity

Easing complexity through connectivity

Straumann offers advanced connectivity to the digital workflow comprising of guided surgery, intraoral scanning, and CAD/CAM, including all the equipment, materials and services required. Customized restorations and extended connections.



- Direct access through Straumann® CARES®
- Access via third-parties with Straumann® CARES® Connectivity

Straumann® milling centers

A partner you can rely on

CONTROLLED, RELIABLE AND PREDICTABLE

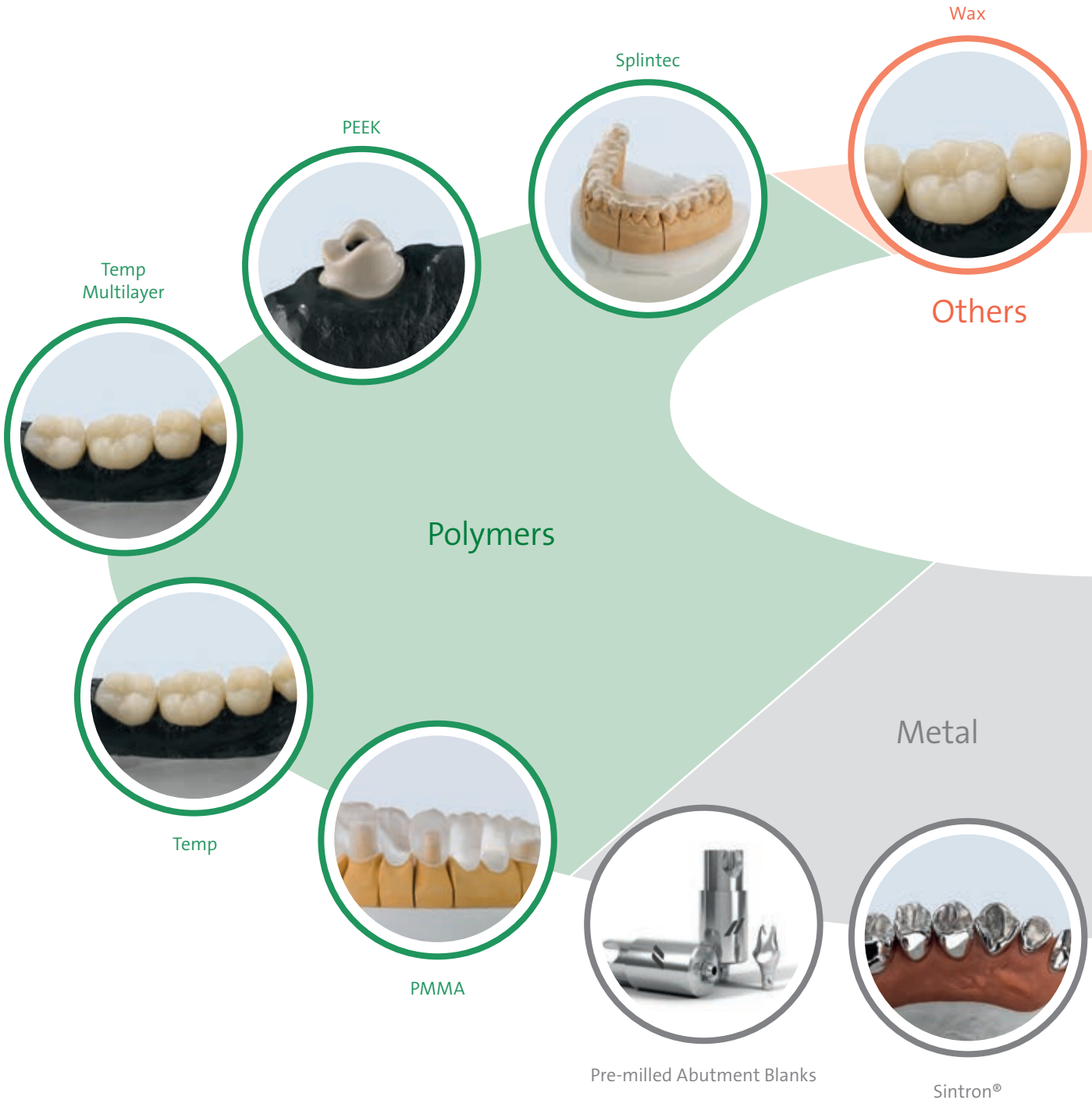
In cases were in-lab production is not an option; with the Straumann® CARES® Visual validated workflow, you can benefit from a work processes that delivers you high-precision restorations from a trusted partner.

- All applications available, from single tooth to 16-unit bridge
- Tooth-borne and implant-borne solutions
- All materials available: from cobalt-chromium, titanium and zirconium dioxide to monolithic materials, such as 3M™ ESPE™ Lava™ Ultimate Restorative and IPS e.max® CAD lithium disilicate

straumann
simply doing more

High-performance CAD/CAM

Materials for high quality in-lab production



In-house production, or manufacture in a Straumann-validated environment - the choice is yours

	In-house Lab	Centralized Milling Centers
	Straumann® CARES® Lab	Straumann® CARES® X-Stream™
On CAD/CAM abutments	Yes	Yes
On Titanium bases	-	Yes

Produce premium products using the high-performance materials from Straumann® and other leading suppliers.

Straumann® CARES® Lab offers a range of CAD/CAM materials, with a portfolio of blocks and disks to meet your specific needs. Our complete range meets the highest quality standards to ensure your lab of reliable, robust and precise results.

CARES® X-Stream™ provides a fully automized solution. With only one scan procedure and adaptive design, all required prosthetic components are manufactured in a Straumann-validated environment and arrive together in one delivery.

Straumann® CARES® for dentists: Intraoral Scanner

Fast digital scanning – designed with the patient in mind

Based on our novel 3D capture technique called Multiscan Imaging™, the extremely compact Straumann® CARES® Intraoral Scanner allows dentists and clinicians to quickly and easily create digital impressions. The remarkably small handpiece, one of the smallest on the market today, is particularly patient-friendly.

Voice and gesture control make the Straumann® CARES® Intraoral Scanner a powerful tool which combines comfort of navigation and hygiene. Dentists, lab technicians, as well as patients all benefit from a digital workflow that delivers huge time savings compared with conventional tray impressions, allowing more time for communication and patient care.

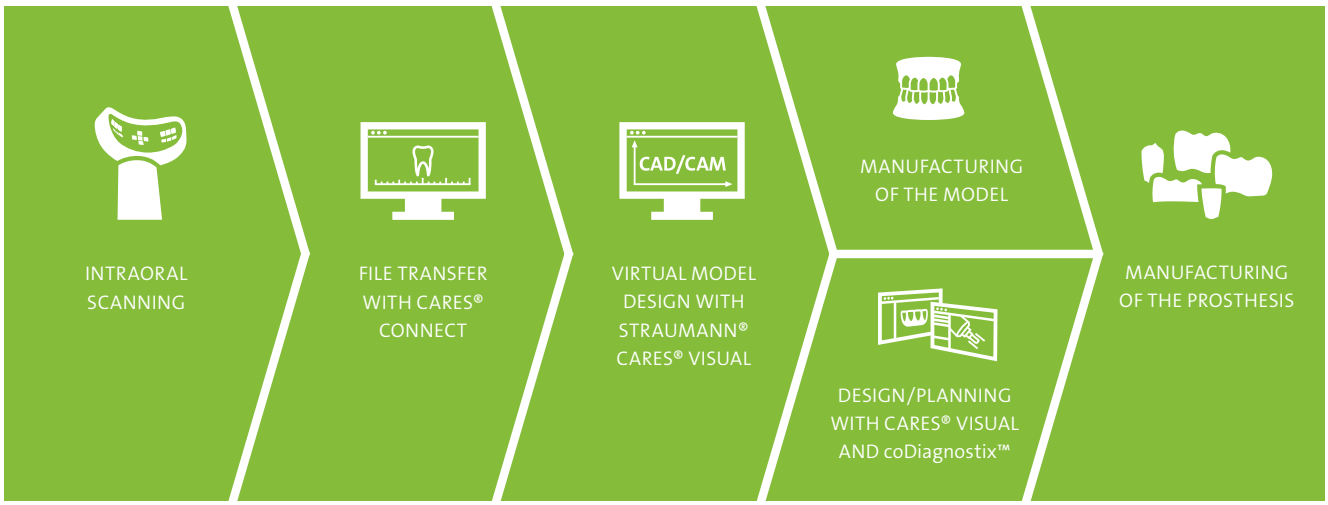
Straumann® CARES®
Intraoral Scanner

REPLACE TRADITIONAL DENTAL IMPRESSIONS WITH HIGHLY ACCURATE DIGITAL DATA

With the Straumann® CARES® Intraoral Scanner you can quickly and easily acquire digital impression data that can be used to design and produce effective prosthodontic solutions. You can save a considerable amount of time compared with conventional methods that require physical models to be fabricated and shipped. Digital impressions replace conventional tray impressions – which are unpleasant for the patient – and treatment can begin much earlier.

A COMPLETE INTEGRATED AND FULLY VALIDATED DIGITAL WORKFLOW: FROM SCAN TO MANUFACTURE.

With the open STL data format, you can send your digital impression directly to your lab partner via Straumann® CARES® Connect.



Straumann® CARES® Intraoral Scanner

Comfort and convenience at your finger tips

Handpiece shown at actual size.

EASE OF HANDLING

The Straumann® CARES® Intraoral Scanner's all-metal handpiece closely resembles that of a standard lightweight dental turbine handpiece in size, shape and feel. The familiar shape of the handpiece allows the dentist to focus on the patient rather than having to maneuver larger unwieldy alternatives.

UNSURPASSED SCANNING ACCESS

Multiscan Imaging™* 3D scanning technology packs the power of five miniaturized 3D scanners into one of the smallest hand-held intraoral scanners available. Teeth and soft tissue are scanned from multiple orientations simultaneously, capturing areas which are normally difficult to visualize.

PATIENT-FOCUSED DESIGN

The Straumann® CARES® Intraoral Scanner replaces conventional tray impressions, which are unpleasant and time-consuming for the patient, allowing you to discuss results and treatment options in real-time with your patient, thereby accelerating treatment.

REAL-TIME DIGITAL RESULTS

A luminescent ring on the handpiece and audible signals indicate when scan data has been successfully captured. You can check data quality in real-time as the software calculates the 3D model, and you can immediately send data to an external service provider.

* Multiscan Imaging™ captures data from all angles simultaneously.

The Straumann® Dental Implant System is a worldwide leading solution for general practitioners and specialists. Our commitment to research ensures high quality backed by independent science. Producing innovations that improve patient care has made us a trusted business partner in over 70 countries.

www.straumann.com

straumann
simply doing more

Excellent results for Straumann implants in independent peri-implantitis study

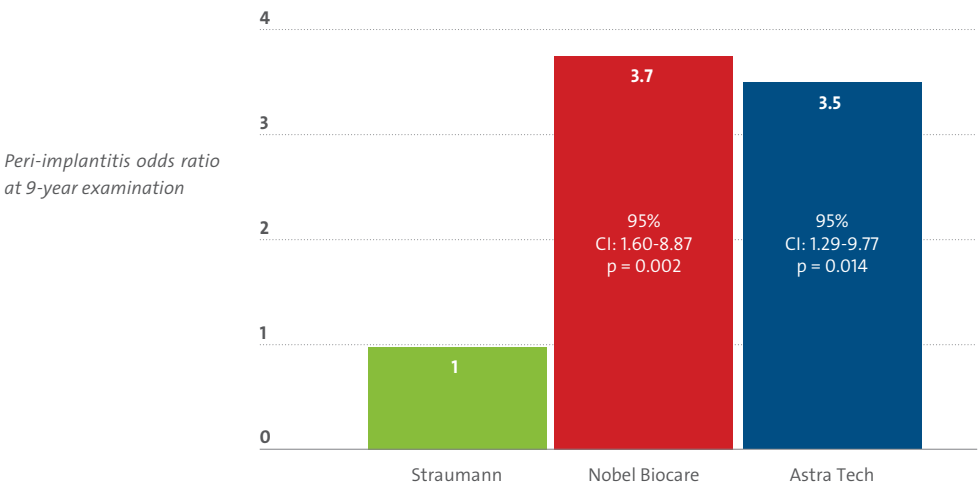
Results from a large independent study on peri-implantitis have shown there are substantial differences between implant systems and the occurrence of peri-implantitis, an inflammation around dental implants that leads to implant loss if not treated.

THE FACTS:

- Large retrospective study[1] of dental implants in broad clinical setting: 427 patients, 1578 implants from various manufacturers, 9-year follow-up.
- Significantly lower odds ratios for moderate/severe peri-implantitis with Straumann® Soft Tissue Level SLA® implants than with the other implant systems evaluated
- Study published in peer-reviewed Journal of Dental Research
- Findings highly relevant for dentists who base their choice of implant on independent clinical evidence

Using the national data register of the Swedish Social Insurance Agency, Dr Jan Derks and colleagues from Gothenburg University in Sweden randomly selected 427 implant patients from a population of approximately 25 000 patients treated 9 years previously by more than 800 clinicians. The selected patients were assessed for typical indicators of peri-implantitis, including bone loss, bleeding, and pocket depth around their implants.
With some exceptions, Nobel Biocare implants had a TiUnite® surface and Astra Tech implants had a TiOblast® surface; all Straumann implants were Tissue Level SLA®.

The investigators observed that the extent of moderate/severe peri-implantitis[2] differed between the implant systems and that the odds ratio of developing it was more than three times higher in the patients treated with Nobel Biocare and Astra Tech Implant System implants. With some exceptions, the Nobel Biocare implants had a TiUnite® surface and the Astra Tech implants had a TiOblast® surface; all the Straumann implants were Tissue Level SLA®.



The results, which were presented at the 2015 EAO and have now been published in the Journal of Dental Research[1], add weight to previously reported findings showing high success rates with Straumann implants [3,4,5,6;7]. These findings are highly relevant for dentists who base their choice of implant on independent clinical evidence.

Straumann® Bone Level Tapered Implant

#StraumannLegend – a truly “magical” campaign for the BLT Implant

In March 2016, Straumann launched the #StraumannLegend campaign, in which the material and surface technologies of Roxolid® and SLActive® combine with a tapered design for exceptional strength and osseointegration properties. The “Excalibur” promotion clip can be found on the websites for the specific countries (blt.straumann.com), together with testimonials, scientific reports, a social media engagement tool – and a special introductory offer.

THE SWORD IN THE STONE – TRY TO SEPARATE THEM!

The humorous promotion clip invokes the legend of King Arthur and the sword Excalibur: Arthur is put to the test as he commences his quest to remove the sword "Excalibur" from the stone in order to lay claim to the throne of Britain. Despite his exceptional strength, the sword remains firmly embedded in the stone – in analogy with the high tensile strength[1] and faster osseointegration[2] of Roxolid® and SLActive® that define the BLT Implant, designed for a strong, long-lasting solution for dental implant therapy. The video clip is the cornerstone of an awareness campaign to underline the strength and reliability of the BLT.

A GLOBAL CAMPAIGN WITH LOCAL IMPACT

The campaign underlines Straumann's goal of going beyond products by significantly restoring and improving patients' quality of life. "#StraumannLegend" is more than a campaign motto – it's a testament to the science and rigorous quality control behind Straumann products and to the company's employees who work tirelessly to deliver the best solutions for customers and patients. The punchline of the promotion clip impressively conveys to the target group the extraordinary quality of Straumann implants made from the innovative material Roxolid®. This patented titanium-zirconium compound is more stable1 than pure titanium and the time required for the healing process is reduced as a result of the SLActive® surface[2].

STRENGTH & SPEED – ABOUT THE BLT

Worldwide demand for tapered implants is growing[3]. Integration of a tapered implant design is a natural extension of the Straumann® Dental Implant System. The BLT is designed to provide primary stability and flexibility in challenging clinical and anatomical situations. Straumann's SLActive® implant surface offers fast osseointegration and healing times are reduced from 6 to 8 weeks to 3 to 4 weeks[2]. As a result, secondary stability is achieved faster and the patient's overall treatment time can be shorter. This scientifically proven implant technology is complemented by a diverse prosthetic portfolio of abutments and customized bars. The corresponding expansion of Straumann's prosthetics portfolio for Straumann® CARES® Advanced Fixed Bars provides the treatment team with a solution for immediate, fixed hybrid dentures: Straumann® Pro Arch.

« AS MARKET LEADER, THE OBJECTIVE WITH OUR NEW BLT IMPLANT WAS NOTHING LESS THAN THE CREATION OF A WHOLE NEW SCIENTIFIC AND TECHNICAL STANDARD IN THE FIELD OF TAPERED IMPLANTS. WE ARE USING THE #STRAUMANN-LEGEND CAMPAIGN TO UNDERLINE OUR CLAIM THAT: WHENYOU CHOOSE STRAUMANN, THE JOURNEY TO BECOMING A LEGEND BEGINS! »

FRANK HEMM
HEAD OF CUSTOMER SOLUTIONS AND EDUCATION

[1] ASTM Standard F67 (covers minimum tensile strength of annealed titanium); data on file for Straumann cold-worked titanium and Roxolid® implants.

[2] Compared to SLA®.

[3] iData Research Inc., 2013 – Millennium Research Group, 2015

Straumann® Bone Level Tapered Implant (BLT)

Immediate single tooth replacement in the anterior maxilla

JOCHEN K. ALIUS

DR. MED DENT

GERMANY

Dental surgeon. Master of Science in Oral Implantology (DGI). Full-time private practice in Nuremberg/ Germany with focus on Implantology and Esthetic Dentistry

www.dr-alius.com

INITIAL SITUATION

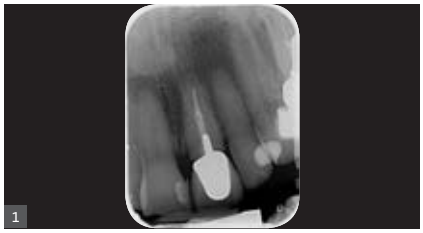
The patient, a 62 year-old female, non-smoker, and in good general health, underwent multiple dental treatments in the past. She came to my practice with an unsatisfactory tooth 21, and wanted this tooth replaced. 21 was previously root-filled and restored with a post and metal-ceramic crown. Radiographically, a gap is seen between the root and post core **(Fig. 1)**, which was consistent with the clinical assessment of a crown-root fracture.

TREATMENT PLANNING

Accurate and thorough treatment planning plays a fundamental role in ensuring a successful treatment outcome. Various treatment options were presented and discussed together with the patient. Tooth extrusion (post/core and crown) leads to very good esthetic results and the tooth can be preserved but the treatment time is prolonged. On the other hand, immediate implantation results in tooth loss, but has the advantages of a good predictable prognosis and long-term result. In the end, the patient opted for implant therapy. Esthetic demands required the use of a strong and fast-healing implant with prosthetic flexibility in order to achieve the desired goal. Since tooth 11 was tilted slightly labially by previous periodontal inflammation, a veneer for this tooth was included in the treatment plan.

SURGICAL PROCEDURE

After careful removal of the crown on 21, the initial suspicion of a crown-root fracture was confirmed **(Fig. 2)**. The remaining root was removed with special consideration to preserve the buccal bone lamella.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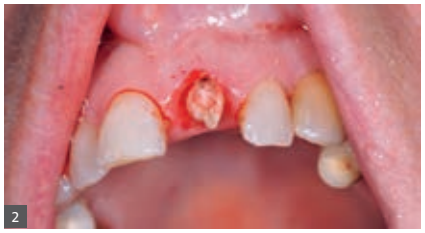
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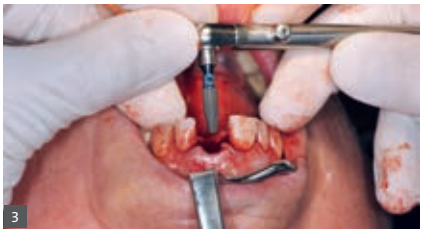
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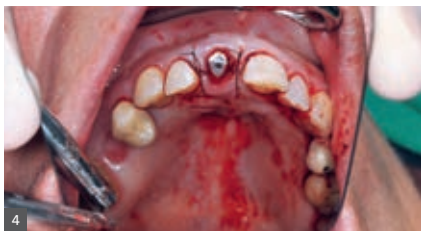
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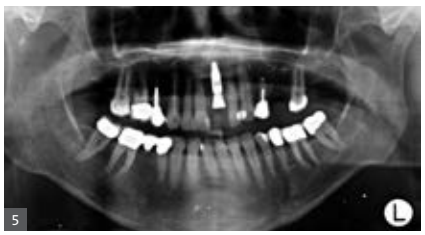
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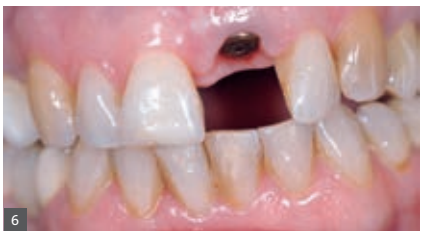
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The preparation of the implant bed was carried out with constant contact of the drill on the palatal bone wall, to avoid any damage of the buccal bone lamella and to ensure that the implant position lies behind the esthetic border line. A Straumann® Bone Level Tapered implant (BLT) was selected for better primary stability and to facilitate immediate loading. The implant bed was underprepared at ∅ 2.8 mm to accommodate a ∅ 4.1 mm Straumann® BLT Implant (Roxolid® SLActive® 12 mm). With the aid of alignment pins and the probe, the implant axis and position were checked in relation to the esthetic border line. The implant was placed with the ratchet and torque control device, and sealed immediately with a healing abutment **(Figs. 3, 4)**. The flap was closed with a 5/0 monofilament suture to allow for a period of transmucosal healing. A post-operative radiograph was taken as a reference **(Fig. 5)**.

PROSTHETIC PROCEDURE

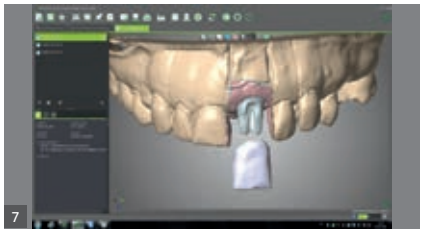
(Fig. 6) shows the clinical situation about 9 weeks after implantation. The peri-implant papillae had slightly resorbed. A lab-fabricated provisional abutment was placed to check the emergence profile of the final zirconia abutment, and to confirm the margin of the abutment in relation to the gingival contour **(Fig. 7)** After the fitting of the provisional abutment, the lab's next step in the digital workflow was to proceed with scanning. The dental technician digitally designed abutment and crown, using the Straumann® CARES® X-Stream™ workflow **(Fig. 8)**. The single delivery of both components resulted in an efficiency improvement at the dental laboratory. The Straumann® CARES® zirconia crown was veneered with compatible porcelain **(Figs. 9, 10)**.

FINAL RESULT

The abutment was secured into the implant at position 21 and the crown cemented onto the abutment. The veneer was also bonded on tooth 11. An X-ray was taken after this final insertion step to provide a baseline reference. **(Fig. 11)**. Follow-up post-operative appointments were scheduled. About 4 weeks after the final restoration was placed, a harmonious gingival contour and natural esthetics is seen intraorally **(Figs. 12)**.

CONCLUSION

With the new design of the Straumann® Bone Level Implant, sufficient primary stability could be achieved even in a difficult initial situation. This is especially significant for immediate implantation with trans-gingival healing in the maxillary anterior region.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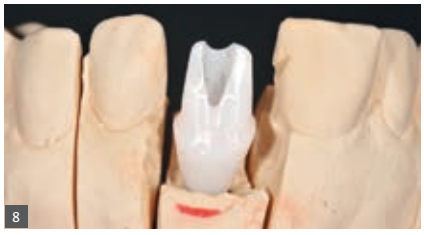
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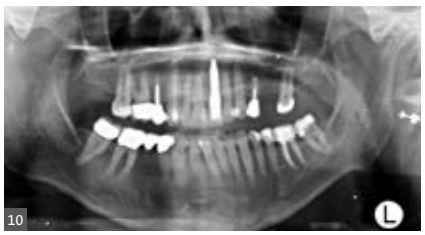
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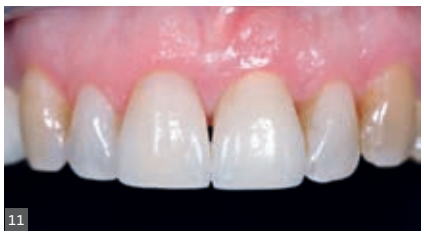
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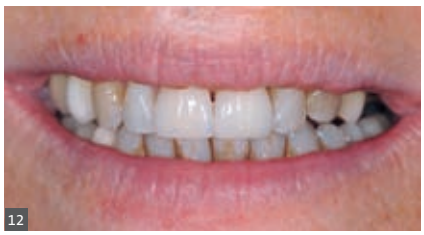
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Straumann® Bone Level Tapered Implant (BLT)

Immediate restoration in the esthetic zone

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INITIAL SITUATION

The patient, a 30 year-old female in good general systemic health, had experienced unsuccessful endodontic treatment and a failed restoration of tooth 22 **(Figs. 1, 2)**.

TREATMENT PLANNING

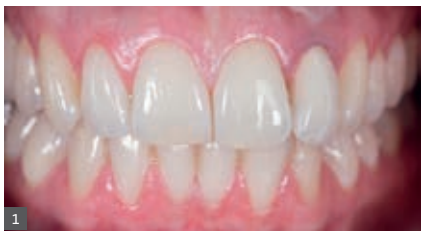
The remaining root was insufficient for retention of a crown and showed periapical complications. The patient had a high lip line when smiling, showing both the papillae and the gingival soft tissue. There was loss of height of the mesial papilla of tooth 22 when compared to the contralateral site.

The patient wished for replacement of this tooth 22 with an implant, in order to have an esthetically pleasing restoration. A decision was made in favor of a Straumann® Bone Level Tapered (BLT) Implant (14 mm, ∅ 4.1 mm).

SURGICAL PROCEDURE

Implant placement was done with a transmucosal approach by preparation of the bony cavity without raising a flap **(Fig. 3)**. The buccal plate was intact, which was a prerequisite for immediate implant placement. The implant was placed towards the palatal side of the socket, leaving a gap of 2 mm to the buccal plate. The gap was filled with a xenograft of bovine bone particles.

The implant showed very high primary stability, which allowed for immediate provisional restoration. The lab-fabricated drilling template also served as the suprastructure for constructing the provisional crown which was adjusted to be out of the patient's occlusion **(Fig. 4)**. The buccal mucosa was augmented with a CTG (connective tissue graft) harvested from the palatal mucosa, which was inserted in a pouch **(Figs. 5, 6)** to bulk out the buccal soft tissue contour.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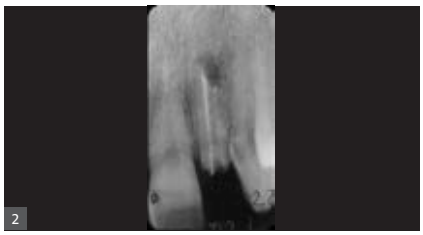
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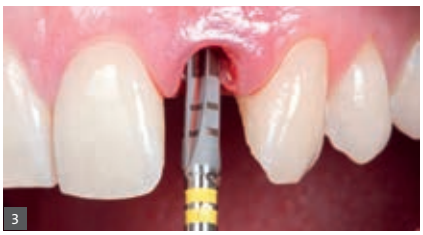
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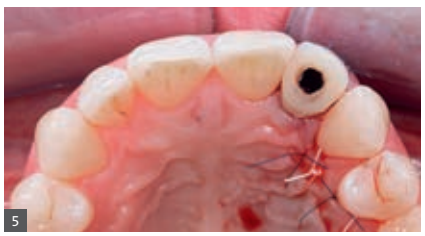
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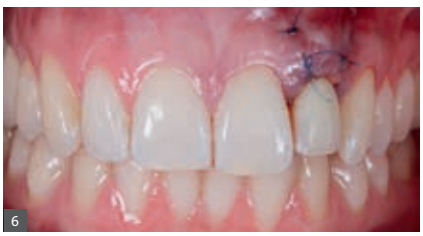
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PROSTHETIC PROCEDURE

After three months of soft and hard tissue healing **(Figs. 7, 8)**, a retrievable screw-retained crown consisting of veneered monocrystalline zirconia on the Straumann Variobase® abutment was used. The crown was constructed without applying pressure to the soft tissue, thus creating a favorable emergence profile. Four months after immediate implant placement and final restoration **(Figs. 9, 10)**, the final periapical radiographic appearance shows healthy tissue integration **(Fig 11)**. The patient was satisfied with both her extra-oral and intra-oral appearance after treatment **(Fig. 12)**.

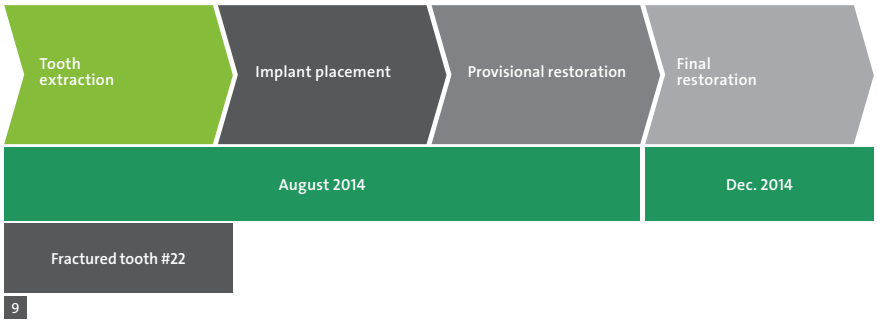
FINAL RESULT

The BLT implant with its macro- and micro-rough surface and optimal biocompatibility satisfies not only immediate treatment requirements, but also meets the patient's esthetic expectations.

CONCLUSION

The new Straumann® Bone Level Tapered Implant shows great primary stability and smooth drilling with the BLT instruments. The insertion is fast, easy and precise due to the design of the implant transfer piece, which allows for good control of vertical positioning.

The ideal macro design of the implant combined with its biological and mechanical concept of platform switching and conical connection makes it a great choice of an implant to use in such cases.



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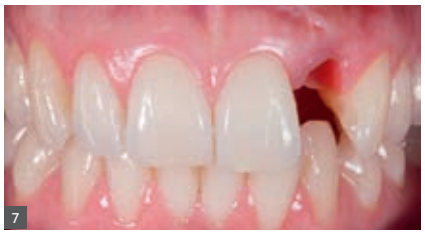
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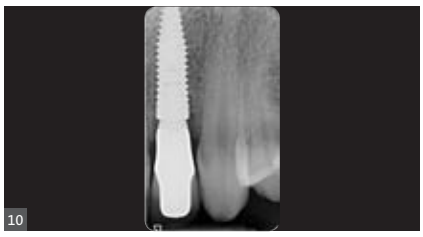
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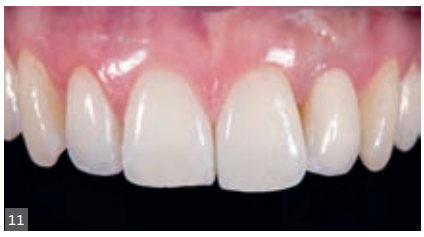
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DID YOU KNOW?

Roxolid® was tested in a comprehensive multicenter clinical trial in 9 countries, including 40 study centers and 603 Roxolid® Implants placed in 357 patients (Al-Nawas et al., 2015). This is the largest clinical research program ever initiated by a dental implant company before the commercial launch of a product.

DID YOU KNOW?

Titanium and zirconium, the two elements which form Roxolid®, are the only two metals which do not inhibit the growth of osteoblasts (Steinemann, 2000). Osteoblasts are bone-forming cells that are essential for successful osseointegration of the implant.

Straumann® Roxolid®

Clinical review

STRONGER THAN TITANIUM

Roxolid® is an alloy of ~85 % titanium and ~15 % zirconium. The combination of the properties of these two metals leads to higher tensile and fatigue strength than comparable titanium implants (Bernhard et al., 2009; Grandin et al., 2012; Ho et al., 2008; Kobayashi et al., 1995).

Higher tensile strength

Ultimate tensile strength is the maximum force that a material withstands without breaking. The higher a material's tensile strength, the lower the risk for forced rupture. Roxolid® shows a 10–15 % higher ultimate tensile strength compared to titanium grade 4 (Medvedev et al. 2016).

Higher fatigue strength

Fatigue strength is the long-term capability of the implant to withstand normal masticatory forces. High fatigue strength is especially important when using reduced-size implants (Grandin et al., 2012). The fatigue strength of Roxolid® SLActive® reduced-diameter implants was found to be up to 21 % greater than that of comparable titanium SLActive® Implants (Medvedev et al., 2016) **(Fig. 1)**.

REDUCED SURGICAL INVASIVENESS

Interest in short-length and reduced-diameter implants is rising globally (Millenium research group, 2015), because they offer the opportunity to avoid bone grafting procedures in cases where there is not enough bone volume or inter-dental space for regular-sized implant placement (Barter et al., 2012; Calvo-Guirado et al., 2015; Chiapasco et al., 2012; Papadimitriou et al., 2015).

Roxolid® reduced-diameter (⌀ ≤ 3.3 mm) Implants

Reduced-diameter implants provide advantages in several clinical indications such as narrow single-tooth gaps or edentulous ridges with limited width (Benic et al., 2013, Lambert et al., 2014, Müller et al., 2015, Quirynen et al., 2014). Five-year follow-up data of a recent randomized controlled trial with a split-mouth design (Al-Nawas et al., 2015) confirmed that Roxolid® reduced-diameter implants provide a safe alternative to titanium grade-4 dental implants (Müller et al., 2015). Clinicians also documented that for more than half of the placed implants, a bone augmentation procedure could be avoided (Al-Nawas et al., 2015; Lambert et al., 2014). A recent systematic review and meta-analysis reported that Roxolid® provides the basis to use reduced-diameter implants with the same level of treatment success as with regular-diameter implants, even in high-loading situations (Altuna et al., 2015).

Roxolid® short-length Implants (≤ 6 mm)

The lack of sufficient bone volume in severely resorbed jaws and in close proximity to the inferior alveolar nerve or the maxillary sinus are challenging clinical situations for the placement of regular-length dental implants. Vertical bone augmentation proce-

dures may be indicated but result in time-consuming, often painful and expensive treatments for the patient with high risk for complications. A Cochran systematic review concluded that short-length implants appear to be a better alternative to vertical bone grafting procedures (Esposito et al., 2006). Clinical evidence exists that Roxolid® short-length implants maintain full function and healthy peri-implant conditions over time with survival rates comparable to longer implants (Calvo-Guirado et al., 2015).

SHORTER TREATMENT TIME

Today, dentists and their patients expect not only a successful dental implant treatment but also a short treatment time. The structure of Roxolid® is similar to titanium allowing the creation of the Straumann® SLA® and SLActive® surface. The SLA® surface is one of the best long-term documented surfaces in dental implantology (Buser et al., 1991; Cochran et al., 1996). SLActive® is a chemically modified hydrophilic nano-structured surface which showed in pre-clinical studies even better osseointegration properties compared to the well-established SLA® surface (Buser et al., 2004; Schwarz et al., 2007).

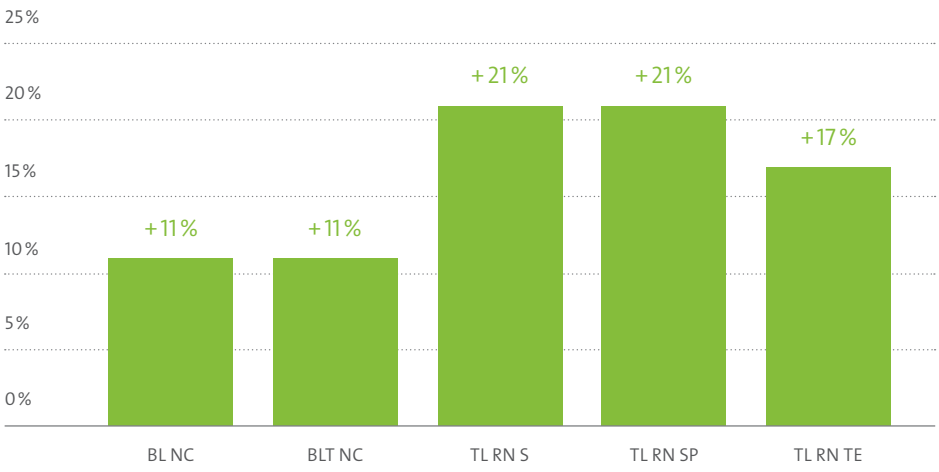
The combination of Roxolid® material with the SLActive® surface leads to better peri-implant bone response and higher removal torque values compared to titanium SLActive® Implants (Gottlow et al., 2012; Thoma et al., 2011; Wen et al., 2013) and can therefore be successfully used in immediate and early treatment protocols (Bornstein et al., 2010; Buser et al., 2013; Nicolau et al., 2013).

MORE TREATMENT OPTIONS

Through its increased strength, Roxolid® Implants offer a wider choice of treatment options with short-length or reduced-diameter implants. In patients with limited ridge width or patients who are not ideal candidates for grafting procedures, Roxolid® can also be the solution to increase patients' acceptance of implant treatment.

In summary, the use of Roxolid® Implants can help to reduce surgical invasiveness, to shorten treatment time with more immediate prosthetic placement, and offer more treatment options with increased patient acceptance for the clinical practice.

Fig. 1. Higher fatigue strength of Roxolid® SLActive® Ø 3.3 mm Implants in comparison to titanium SLActive® Ø 3.3 mm Implants.



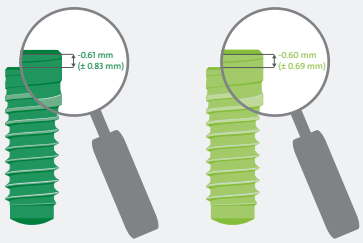
BL NC Bone Level Implant / Narrow Crossfit®
BLT NC Bone Level Tapered Implant / Narrow Crossfit®
TL RN S Tissue Level / Regular Neck / Standard Implant
TL RN SP Tissue Level / Regular Neck / Standard Plus Implant
TL RN TE Tissue Level / Regular Neck / Tapered Effect Implant

Straumann introduces “Lifetime Guarantee Plus” for Roxolid® implants

FRANK HEMM
HEAD OF CUSTOMER SOLUTIONS
AND EDUCATION

5 years of validated clinical performance.[4]

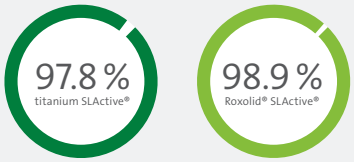
Bone level change



Titanium Roxolid®

There was no statistically significant difference between the crestal bone level changes for Roxolid® compared to titanium implants five years after implant placement.

Implant survival



AN INTERVIEW WITH FRANK HEMM

Roxolid® has brought a new level of confidence to implant dentistry that enables Straumann to offer an industry leading guarantee. Frank Hemm, Executive Vice President and Head of Customer Solutions & Education, explains why Straumann has taken this decision and what it means for surgeons and patients.

Straumann already offers a lifetime guarantee on its titanium implants; what does the Roxolid® Lifetime Plus guarantee offer in addition?
Frank Hemm: Our ‘standard’ lifetime guarantee covers the replacement of the implant in the rare event of breakage and is valid for the patient’s lifetime. Few manufacturers offer this level of warranty. For our Roxolid® implants, we are extending the lifetime guarantee in some countries to include a monetary contribution to the follow-up treatment costs.

How much is the monetary contribution?
Frank Hemm: It varies from country to country. The average amount is CHF 1000, which is paid to the surgeon and is intended to cover part of the cost resulting from additional treatment planning, chair time and follow-up treatment to replace the fractured implant.

Where is it available?
Frank Hemm: Unfortunately we are not able to offer the Lifetime Plus in every country yet – for administrative and other reasons. However, it is available in all major markets and we are working on making it as widely available as possible.

What is the benefit?
Frank Hemm: We have invested years of expertise, scientific research and clinical experience in perfecting the design and material properties of our implants and abutments. In addition, we conduct numerous quality checks - all in order to minimize the possibility of implant fracture. As a result, fractures are very rare with Straumann implants. Implant breakages are unpleasant for the patient and the surgeon. Until now, the treatment costs for replacing an implant in the event of breakage had to be borne by the dentist and/or the patient. Straumann is the first leading dental implant manufacturer to offer a lifetime warranty covering both the product and a contribution to the treatment costs.

Fig. 1: *Five years of validated clinical performance. First launched in 2009, Roxolid® is available in Straumann’s entire implant portfolio throughout the world, depending on registration processes. Some major markets have shown a major switch from titanium to Roxolid..*

What has prompted Straumann to take this bold step?

Frank Hemm: Science and clinical evidence. Roxolid® is stronger than pure titanium[1] and has excellent osseointegration capabilities. Implant fractures are very rare and success rates are very high[2]. We already had extensive data from mechanical strength and durability tests before we introduced Roxolid. Then it was tested in the largest clinical research program initiated by a dental implant company prior to commercial launch. Publications arising from the program currently cover 922 implants, 607 patients and 57 clinical centers[3] with up to three years of follow-up[2] (see **Tab. 1**). One of the most recent publications, a scientific review, reported survival and success rates of 98.4% and 97.8% respectively.[2] Another recent publication reported five-year results from a randomized controlled clinical trial showing that survival and success of Roxolid® implants are maintained over time[4]. To add to this body of scientific evidence, Straumann's Quality Compliance statistics show that the cumulative fracture rate of all 3.3 mm Roxolid® implants sold to date is just 0.04%[1], which is significantly lower than the rate for our titanium equivalents. This is why surgeons can be confident with Roxolid. The Lifetime Plus Guarantee adds a further level of confidence for them and their patients.

The standard guarantee on all Straumann implants applies worldwide for the lifetime of the patient and covers the implant in case of breakage – irrespective of whether it is made of titanium, ceramic or Roxolid. The Lifetime Plus guarantee is available, for Roxolid® only, in Europe and North America with other regions to follow depending on legal and organizational constraints. For both the Straumann guarantee and the Lifetime Plus guarantee, adherence to the clinical protocol and the approved indications is a precondition.

Scientific references: straumann.com/stargetref

	Type of study	Number of centers	Number of patients	Number of implants	Survival Rate	Success Rate
Barter et al (2012)	Prospective single cohort	2	22	21	95.2%	95.2%
Chiapasco et al. (2012)	Prospective	1	18	51	100%	100%
Benic et al. (2013)	Randomized Controlled Trial	2	40	20	100%	100%
Akca et al. (2013)	Prospective single cohort	1	23	52	100%	100%
Cordaro et al. (2013)	Retrospective	1	10	40	100%	97.5%
Tolentino et al. (2014)	Prospective	1	42	21	95.2%	95.2%
Quirynen et al (2015)	Randomized Clinical Trial	8	75	75	98.7%	98.7%
Al-Nawas et al (2015)	Prospective non-interventional	40	357	603	97.6%	96.4%
Lambert et al (2015)	Prospective	1	20	39	94.7%	94.7%

Tab. 1: *Relevant clinical studies with Roxolid® implants (Altuna P, et al. 2016)*

Straumann® Pro Arch/Straumann® Bone Level Tapered Implant

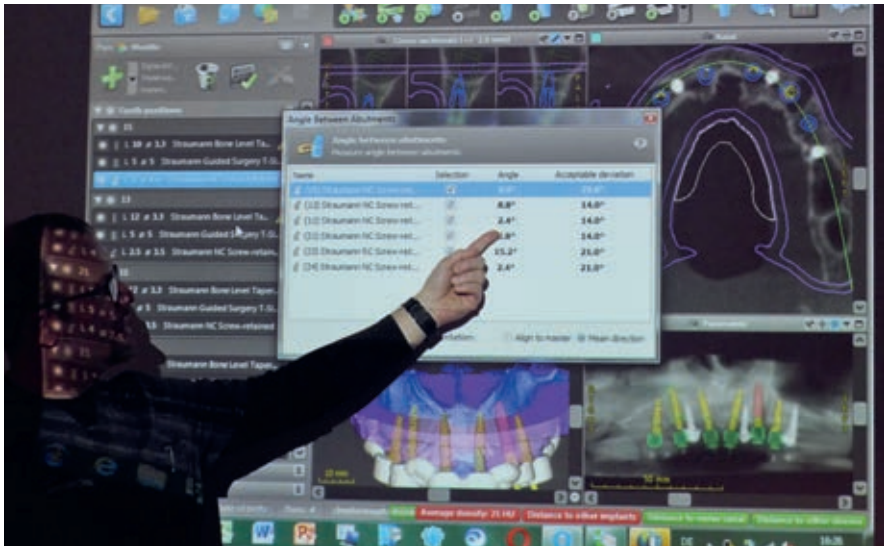
More than 27 edentulous jaws restored in 4 days

A SYMPHONY OF TREATMENT WORKFLOW, PRODUCT DESIGN, MATERIAL AND SURFACE

The Straumann® Pro Arch solution is based on the treatment concept introduced by Paulo Malo (Malo et al., 2003b) and offers a safe, reliable and less complex treatment option for patients requiring full-arch treatments. Patients and clinicians benefit from the combination of the individualized prosthetics and the surgical advantages of the Straumann® SLActive® implant surface, as well as the unique material properties of Roxolid®. In combination with the Straumann® Bone Level Tapered Implant this solution offers the perfect symbiosis of treatment workflow, product design, material and surface: excellent primary stability even in compromised bone situations, with surface properties designed to maximize your treatment success and predictability.

March 2016: together with our Polish Distributor, Schmidtdental (www.schmidt-dental.pl), Straumann set up a 4-day clinical event with 22 patients (27 edentulous jaw cases) in Warsaw. Lead by Dr. Krzysztof Chmielewski, 15 selected clinicians took part in this study, which put to the test of daily practice the BLT implant in combination with Straumann® Guided Surgery (now BLT-ready) and the Straumann® Pro Arch solution. One of the key goals was to provide these top surgeons with a unique clinical experience to fully convince them of the Straumann solutions.

Sunday, March 13th at 10 am in Warsaw – the moment of truth: 4 clinics, 15 clinicians, more than 25 patient cases in 4 days with 4 supervisors! The key challenge was that all the cases had to be from the category “advanced” and/or “complex”, while the surgeons were the first group worldwide to use the BLT implant in a Straumann® Guided Surgery procedure, in combination with dental wings, temporary implants and the latest devices from Osstell and W&H. After 3 months of intense preparation and planning, 15 clinicians entered the first dental clinic, “Klinika Proimplant”. Oliver Schmidt, Dr. Krzysztof Chmielewski and Prof. Dr. Michel Dard explained the event, the objectives and the whole procedure, encompassing the new, BLT-ready Straumann® Guided Surgery System, which would be used for the very first time in the world. After the introduction, Dr. Chmielewski performed a live surgery, which was trans-



mitted to the lecture room. Subsequently, the clinicians had the chance to ask questions and obtain more details on the procedure. They were also able to take a close look at the components.

Monday, March 14th at 9 am: the individual surgeries start in 4 clinics in Warsaw. Each surgery is supervised by one of these experienced mentors: Dr. **Krzysztof Chmielewski**, Dr. **Orcan Yüksel**, Dr. **Pedro Goncalves** and Prof. Dr. **Michel Dard**.

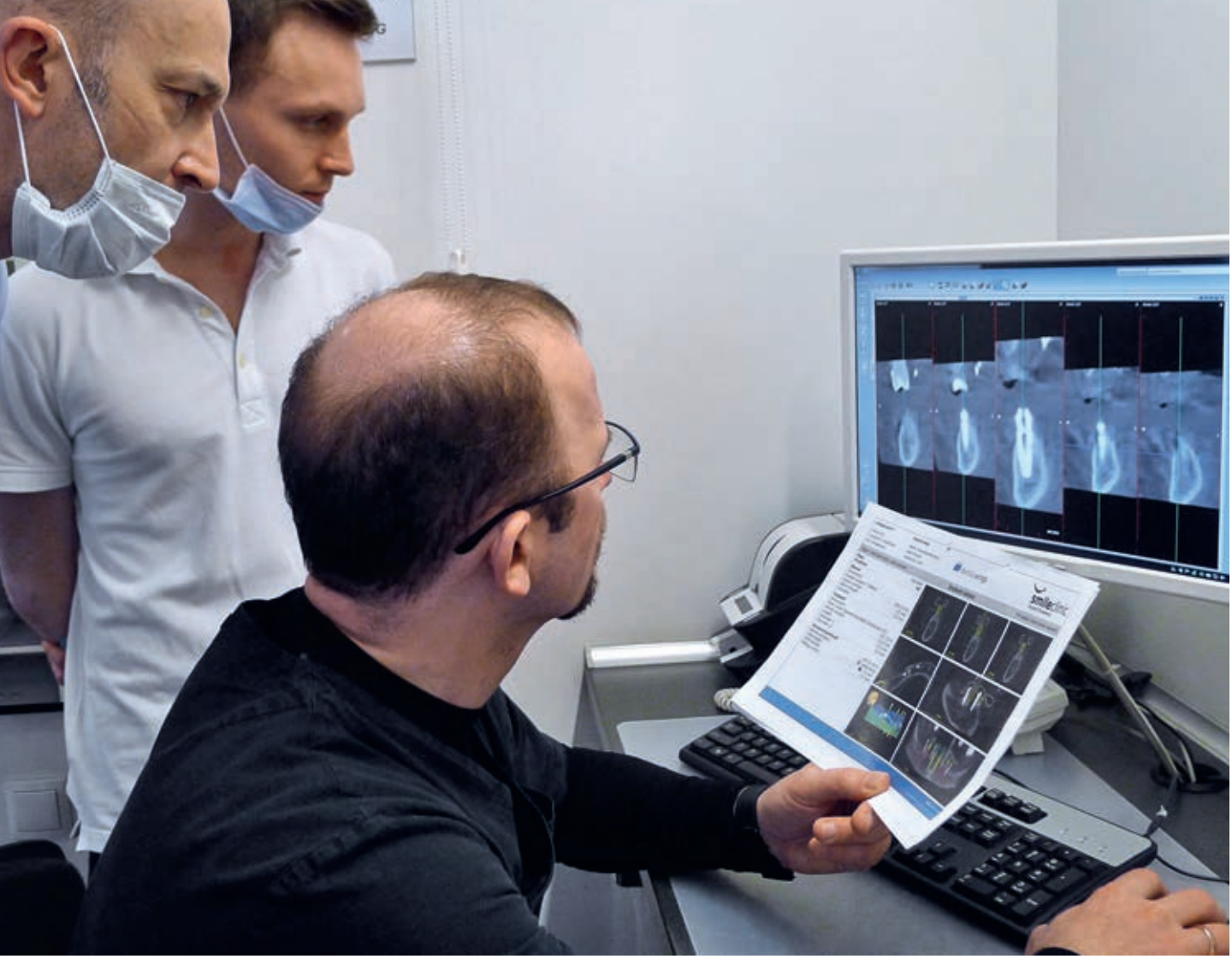
Study Poland

straumann

THE STRAUMANN P2P PROGRAM

The P2P (Peer-to-Peer) program is a unique breakthrough in partnering with clinicians and linking research to clinical excellence. It started around 2 years ago and is currently expanding worldwide. Thanks to the Straumann Research Team and the local distributor in Poland, 15 surgeons with a high level of clinical expertise were identified, and they then participated in a clinical investigation to develop further the ProArch surgical technique. From the initial pilot cases to the calibration of the peers, the project culminated in an in-line case series in which 27 fully edentulous cases were fully rehabilitated and documented in 4 days (Hotchkiss et al., 2016).

Malo P, Rangert B, Nobre M (2003b). Clin Implant Dent Relat Res 5 Suppl 1:2-9.



A big thank you to all the clinic owners in Warsaw who provided up to 2 surgery rooms in their clinics to ensure a smooth process:

Dr. Wojciech Ryncarz
Klinika Proimplant

Dr. Beata Szwarc
SmileMakers

Dr. Dariusz Niesiobędzki
Impladent

Dr. Bernard Zadrożny
2th Clinic

Thursday, March 17th: During these 4 days, the patients received an implant-borne full-arch restoration on the same day as the treatment. Every patient case was planned individually with Straumann® CoDiagnostiX® and executed with the Straumann® Gudided Surgery System using 3D-printed surgical guides. Clinically, such a strategy was a critical success factor in ensuring a consistent surgical approach and predictable outcomes. Based on this thorough planning and preparation, backed up by close collaboration with all stakeholders, the team managed to provide all the patients with a new full-arch restoration. The guided surgery workflow show-cased the Straumann approach to edentulous cases: maximum bone preservation (i.e. with no bone grinding) and a minimally invasive procedure – virtually all cases were planned and completed flapless. This has never been achieved before in such a setting and on such a scale. Furthermore, the professional assistance provided by the Straumann clinical team also cemented the trust of the participating surgeons. The "moment of truth" for some clinicians came at the post-op CBCT. They were very impressed to see such a level of precision that could be achieved with the new system from the outset. This rewarding experience helped win the hearts and minds and demonstrated the benefits of the new BLT guided surgery and the precision in the planning with CoDiagnostiX™.

Besides the professional work, the peer-to-peer concept from Straumann in this Polish study group was also a success. New options, challenges and horizons are possible, feasible and visible in strong partnerships.

If you want to learn more about this clinical event, visit STARGET online for the full version with more information, more pictures and multimedia extras!

http://ow.ly/AnRJ302qDcS

Straumann® Pro Arch

The team approach in a complete mouth hybrid reconstruction using the indirect method for provisionalization

ROBERT A. LEVINE

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INITIAL SITUATION

A periodontist and ITI colleague whose office is two hours from our practices referred this patient to our team. Initially, she was seen by the prosthodontist, Dr. Harry Randel, and subsequently referred to the periodontist, Dr. Robert Levine, for a team approach to solve her failing dentition. The patient presented at our office as a 65 year-old non-smoking female (ASA 3: Illnesses under treatment: anxiety/depression, osteoarthritis, fibromyalgia, hypothyroidism and history of myofacial pain dysfunction) **(Figs. 1-3)**.

There was a history of TMJ issues (i.e. clicking and pain with her right side TM joint) which presently is under control and pain-free. Her chief complaint was to improve her esthetics and comfort with a desire for a permanent and quick solution to replace her failing dentition. She also desires a reduction of her maxillary anterior gummy smile in the final prosthesis. She arrived at our office for a third surgical consult for an immediate load maxillary and mandibular hybrid restoration using the Straumann® Pro Arch treatment concept (tilting of the distal implants to avoid anatomic structures of the maxillary sinus, mandibular mental foramina). This treatment concept reduced the need for additional surgeries and number of implants needed to provide a fixed hybrid restoration with a first molar occlusion. A medium to high lip line was noted upon a wide smile with a bi-level plane of occlusion. Also noted was supraeruption of her maxillary and mandibular anterior teeth (FDI: #12, 11, 21, 22 and #41-43, US: #7-10 and #25-27) creating a deep bite of 6mm **(Fig. 2)**.

A Class I canine relationship was recorded with 6 mm overjet and 6 mm overbite. Due to her medication-related dry mouth issue, generalized recurrent caries were noted. Periodontal probing depths ranged generally from 4-7mm in the maxillary jaw and from 4 to 6mm in the mandibular jaw with moderate to severe marginal gingival bleeding upon probing in both jaws. Tooth #6 (FDI: #13) was noted to have a vertical fracture clinically. There was generalized heavy fremitus in her maxillary teeth and mobilities ranging from 2-3 degrees on the following teeth: #3, 7 thru 13, 20-26 and 29 (FDI: #16, 12, 11, 21-25, 31-35, 41-42 and 45). Her compliance profile was good with her previous dentists, however, she states as always having “issues with my gums.” The tentative treatment plan discussed at the initial visit with the patient and her husband included the following. **Diagnosis:** Generalized moderate to advanced periodontitis; generalized recurrent caries related to medication-related dry mouth; posterior bite collapse with loss of occlusal vertical dimension (“mutilated dentition”). **Prognosis:** all remaining teeth are hopeless.

TREATMENT PLAN

1. Obtain a CBCT of both arches to evaluate bone quality, bone quantity, and anatomical limitations **(Fig. 4)**.

2. Articulate study models with fabrication of diagnostic full upper denture (FUD), full lower denture (FLD) and surgical guide templates.

3. Team discussions to develop the final surgical and prosthetic treatment plan for hybrid restorations using the Straumann® Bone Level Tapered Implant (BLT) with a first molar occlusion. Utilization of an indirect technique will be used to fabricate the converted fixed laboratory metal-reinforced provisionals in one day.

4. Coordination of the surgical visit (Dr Robert Levine) with the prosthodontist's office (Dr. Harry Randel), dental laboratory (NewTech Dental Laboratory, Lansdale, PA), and the dental implant company representative (Straumann USA, Andover, MA). The patient is aware of the possible need to wear one or both dentures during the healing phase if the insertion torque values are inadequate for immediate loading. This may be due to bone quality, bone quantity, or need for extensive bone grafting requiring a membrane technique for guided bone regeneration (GBR) and a 2-stage approach. This is very important to review with all patients, especially when only four implants are planned in the maxilla, as the distal implants(s) may record poor insertion torque values due to bone quality and quantity. The ability to use longer, tapered (BLTs), and tilted implants - as in the present case - with adequate buccal bone available for the anticipated 4.1mm implants help to reduce this possibility significantly.

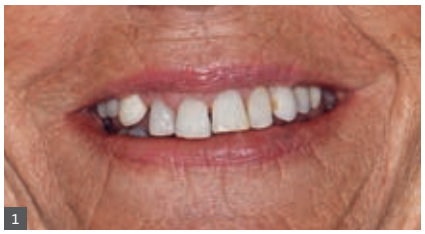
5. Delivery of the fixed provisionals in one day in the prosthodontist's office.

HARRY RANDEL

DMD

USA

Fellow, International Team for Implantology. Private Practice in Prosthodontics & Advanced Restorative Dentistry, Philadelphia & Blue Bell, PA.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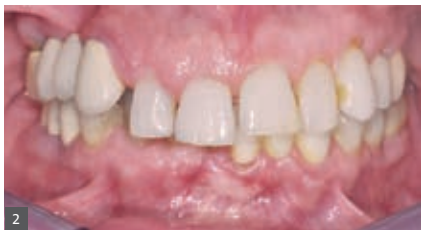
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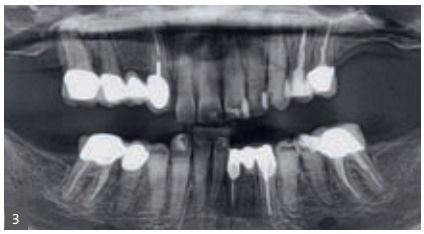
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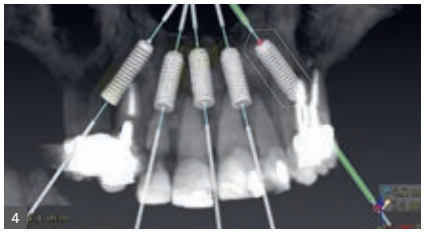
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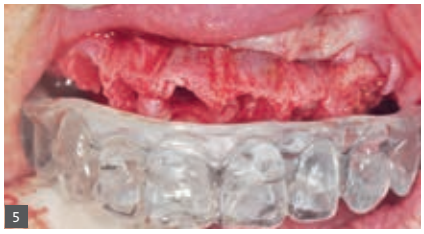
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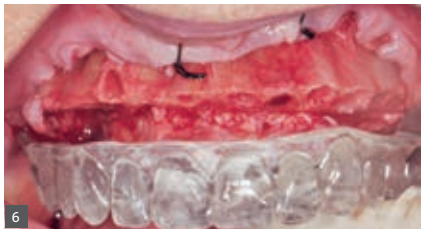
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6. Post-operative visits every 2-3 weeks with the periodontist's office for deplaquing, review of plaque control techniques and delivery of a water irrigation device at 6 weeks. An occlusal adjustment to be completed at each post-operative visit with the surgical and restorative offices, because the occlusion is very dynamic as the patient's musculature continues to accept her newly restored occlusal vertical dimension (OVD). Time is also needed to stabilize her TMJ symptoms.

7. Completion of final case at least 3 months post-surgery. Since the patient will be spending the winter in Florida, she will commence her final treatment when she returns in the spring.

8. Periodontal maintenance every 3 months alternating between offices.

Based on CBCT analysis it was decided to place 5 implants in the upper jaw at the following sites: #4 (FDI: #15) (tilted), #7 (FDI: #12), between #8 & #9 (FDI: #11 & #21) (midline), #10 and #12 (FDI: #22 and #24) (tilted) after vertical bone reduction for prosthetic room. Four implants were anticipated to be placed in the lower jaw at sites #21 (FDI: #34) (tilted), #23 (FDI: #32), #26 (FDI: #42), & #28 (FDI: #44) (tilted). The anticipated position of each implant is ideally palatal in the maxilla to the original teeth and lingual to the original mandibular teeth. This is to allow for screw-access holes exiting away from the incisal edges anteriorly, and if possible lingual to the central fossae in the posterior sextants. An additional benefit of palatal and lingual placement of each implant is that their final position will be at least 2-3 mm from the anticipated buccal plates, which is beneficial for long-term bone maintenance and implant survival. If the necessary 2 mm buccal bone to the final implant position is not available, then contour augmentation (bone grafting) is recommended to create that dimension. The goal is to prevent buccal wall resorption over time using slowly resorbing inorganic bovine bone and a resorbable collagen membrane. This membrane allows easy contouring and flexibility over the graft material when wet. It is also important to evaluate tissue thickness. It is ideal to have at least 2mm of buccal flap thickness over each implant as thin tissues are associated with bone loss and recession over time. Either connective tissue grafts from the palatal flap or tuberosity can be harvested and sutured under the buccal flap. Alternatively, an allograft connective tissue or a thick collagen material can be used to thicken the buccal flaps when necessary.

SURGICAL APPOINTMENT

The patient was pre-medicated with oral sedation (triazolam 0.25mg), amoxicillin, a steroid dose pack and chlorhexidine gluconate (CHG) rinse, all starting 1 hour prior to surgery. The patient's chin and nose were marked with indelible marker, and the OVD was measured using a sterile tongue depressor with similar markings while the patient's mouth remained closed. The patient was then given full mouth local anesthesia. Starting with the maxillary arch, full thickness flaps were raised and sutured to the buccal mucosa with 4-0 silk to provide improved surgical access and vision. The teeth were removed with the goal of buccal plate preservation using the PIEZOSURGERY® (Mectron: Columbus, OH) for bone preservation (tips EX 1, Ex 2, Micro saw: OT7S-3). The sockets were degranulated with PIEZOSURGERY® (tip: OT4) and irrigated thoroughly with sterile water. With the anatomically correct surgical guide in position and firmly held in place by the surgical assistant, measurements were made from the mid-buccal of each tooth. Surgical cuts were made going from the anticipated cantilever of site #3 (FDI: #16) to site #14 (FDI: #26) using the PIEZOSURGERY® saw (tip: OT7). Our team goal was to create the prosthetic room necessary for a hybrid restoration i.e. 10-12 mm. The cuts were intentionally extended beyond the anticipated cantilever length to create adequate strength and thickness of the final prosthesis in these unsupported cantilever areas **(Figs. 5-6)**.

The mandibular arch was treated in a similar manner. Additionally, bilateral mandibular tori reduction was accomplished with the

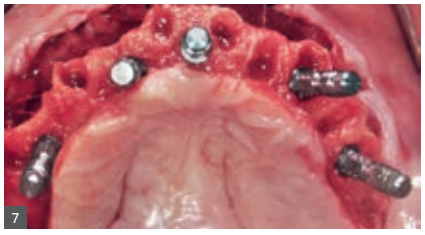
aid of the PIEZOSURGERY® saw (tip: OT7) after the extractions and prior to the vertical bone reduction of the mandibular ridge. Subsequently the implants were placed. The implant sites were prepared per the manufacturer's protocol (except for bone tapping) for the Straumann® BLT implant. The implants were placed using the surgical guide template with the following insertion torques measured: site: FDI: #15, #12, #11, #21,#23,#25, #34, #32,#42/US: #4, #7, #8-9,#11,#13, #21,#23,#26. All torques were >35Ncm with #28 (FDI: #44) recording 20Ncm insertion torque values. All implants were 4.1mm in diameter and 14mm in length except FDI: #12, #11, #21, and #23/US: #7, #8-9, and #11, which were 12mm in length **(Fig. 7)**.

All 17 and 30 degree-angled implants were bone profiled prior to SRA abutment placement. This allowed the complete seating of the SRA abutment at the recommended 35Ncm torque. Using the available Straumann® bone profilers with the appropriate Narrow Connection (NC) or Regular Connection (RC) inserts was a critical step for an abutment to fit correctly. The following SRA abutments (all were 2.5mm gingival heights) were then chosen: straight: FDI: #32, #42/US: #23, #26; 17 degrees: FDI: #15, #12, #11, #21/US: #4, #7, #8-9; and 30 degrees: FDI: #23, #25, #34, and #44/US: #11, #13, #21, and #28. Tall protective healing caps were then placed **(Fig. 8)**, and the dentures were checked to evaluate that there was adequate space for the pink acrylic to allow for bite registration material thickness. All sockets and buccal gaps to the immediately placed implants were bone grafted.

Prior to suturing, the tissue flaps were scalloped with 15c blades to reduce overlap of the flaps over the protective caps. This not only aided in post-operative healing, but also aided in the visualization of the abutments by the restorative dentist for the provisional insertion. The patient was sutured with resorbable 4-0 chromic gut and 5-0 Vicryl™ sutures (Ethicon: Johnson & Johnson) and was released to be seen immediately by Dr. Randel for the coordinated restorative visit. As discussed below,

« WITH THE TAPERED DESIGN OF THE STRAUMANN® BONE LEVEL TAPERED IMPLANT, MAXILLARY ANTERIOR AREAS COULD BE UTILIZED BY THE SURGEON TO AVOID APICAL FENESTRATIONS WHERE UNDERCUTS COULD BECOME PROBLEMATIC USING STRAIGHT-WALLED BONE LEVEL IMPLANTS. THE COORDINATED APPOINTMENTS, ALONG WITH THE SYMPHONY-LIKE STEPS IN THE PROCEDURE, CREATED A POSITIVE, "SEAMLESS" EXPERIENCE FOR THE PATIENT. »

ROBERT LEVINE/HARRY RANDEL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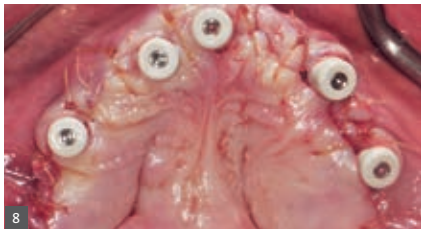
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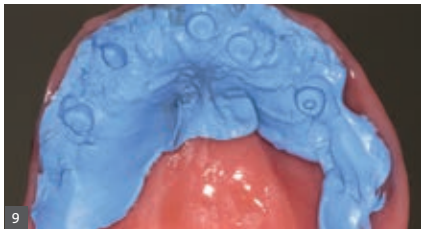
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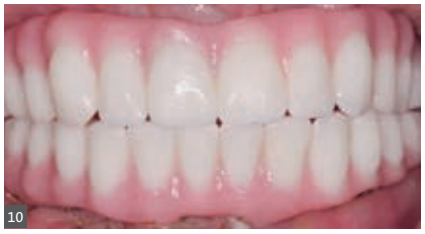
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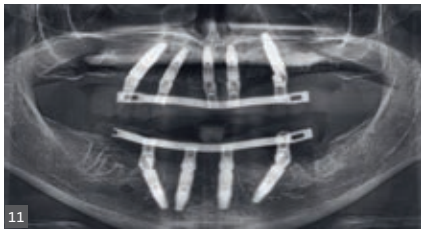
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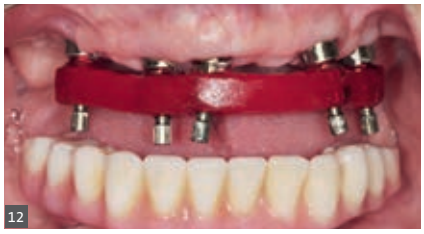
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his responsibilities included: bite registration, impressions, and the dental lab conversion of the complete denture to a metal-reinforced fixed transitional prosthesis (indirect provisionalization technique). Our team of restorative dentists have been treating full-arch immediately loaded cases on 5-8 implants (depending if restoration is a hybrid or C&B) since 1994. Our earlier experiences, for approximately the first two years (1994-1996), have resulted in us all presently using the indirect technique, which in our hands is easier for everyone involved (especially the patient). We handle these coordinated visits between offices, the dental lab, and our Straumann representative weeks in advance so we are all on the same page with timing. These coordinated efforts could be compared to a symphony orchestra, where each musician knows their specific part and when and where they are expected to be. Many of our patients have described this fluidity as a seamless experience that they witness first hand and greatly appreciate.

SAME DAY RESTORATIVE APPOINTMENT WITH DR. RANDEL (PROSTHODONTIST)

The patient was seen in Dr. Robert Levine's office for restorative records in preparation for immediate load protocol. The previously processed dentures were first checked with pressure paste to ensure the absence of contact between the intaglio surface and the tall healing caps. Bite registration material was then used to confirm there was no contact **(Fig. 9)**, and later will be used by the lab to articulate the models. Efforts were made to confirm the OVD (with the marked tongue depressor provided by Dr. Levine), incisal position, midline, plane of occlusion, and centric position with the prosthesis in place. Adjustments were made as needed. Photographs were acquired to document and relay information via e-mail to the lab technician. The lab will use the registration material left in the intaglio surface of the prostheses, as healing caps will be placed on the newly fabricated models. This allows the index to transfer the OVD and centric relationships with contact just on the healing caps. The soft tissue plays no role in this relationship. A bite registration was made to confirm centric relation. Healing caps were then removed and open tray impression copings were placed. If the connection between the implant abutments and the impression copings are not visualized, then x-ray confirmation of the connection is needed. Transfer impressions were made using a custom tray and rigid impression material of choice, in this case polyether was used. Our lab courier delivered the dentures and impressions to the lab for the conversion to metal-reinforced, screw retained provisionals, which were delivered back to the restorative office within 24 hours. The next afternoon, the prostheses were inserted **(Fig. 10)** and panoramic radiographic confirmation of proper seating was obtained **(Fig. 11)**.

Any necessary occlusal adjustments were then completed. The patient was then seen every 2-3 weeks for deplaquing and plaque control review per our earlier discussed protocol. The occlusion was also refined as needed. The patient's TMJ symptoms were significantly reduced within the first 3 weeks. A water irrigation device was given and reviewed at 6 weeks post-surgery. As the patient was in Florida for the winter, and unable to come in after the typical 3 month protocol, she was seen 4 ½ months after the surgery. At that time, periapical x-rays of each implant were done to confirm bone healing. The prostheses were removed and cleaned. GC verification jigs **(Fig. 12)**, made on the original models and fabricated prior to the appointment, were tried in. If passivity is not confirmed, then the GC jig can be cut and re-indexed. Once the fit of the verification jigs was confirmed, custom trays were used to transfer the relationships **(Fig. 13)**.

During the following appointments, OVD and centric relations were obtained, and the wax try-ins were confirmed for esthetics, phonetics, and occlusion prior to the milling of the framework **(Fig. 14)**.

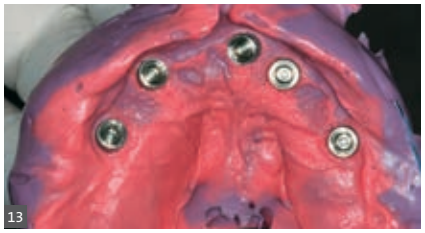
It is important to confirm tooth location prior to milling the framework so that the framework was designed within the pa-

rameters of the acrylic/tooth borders. At the insertion appointment, the healing caps were removed and cleaned with chlorhexidine. Figure 15 demonstrates the excellent healing of the soft tissue prior to insertion of the prosthesis. Once inserted, the esthetics, phonetics, and OVD of the prosthesis were confirmed. The occlusion was adjusted as needed. Screws were tightened to 15 Ncm, screw access openings were filled with Teflon tape to within 2mm of the surface, and a soft material such as Telio or Fermit was used to seal the access. A maxillary acrylic nightguard was fabricated to help protect the occlusal surfaces from wear and reduce any parafunctional habits. The completed case is shown **(Figs. 15-18)**.

At subsequent appointments, the prostheses were evaluated to determine if they needed to be removed to assess the soft tissue or if any contouring of the acrylic was necessary. Eventually the soft material used to close the access can be replaced with a hard composite material.

CONCLUSION

A Complex-SAC Straumann® Pro Arch Case was presented. Management of this treatment utilized the advantages of the team approach for maximizing our combined knowledge to benefit the patient, consistent with ITI doctrine. The use of the BLT implants, due to excellent initial stability, gave us the confidence in our ability to not only use immediate extraction sites (Type 1 implant placement), but also to increase avoidance of anatomic structures. In this case, the structures include the maxillary sinuses, nasopalatine and mental foramina, as well as the inferior alveolar nerve canals. In addition, with the tapered design of the BLT implant, maxillary anterior areas could be utilized by the surgeon to avoid apical fenestrations where undercuts could become problematic using straight-walled bone level implants. The coordinated appointments, along with the symphony-like steps in the procedure, created a positive, “seamless” experience for the patient.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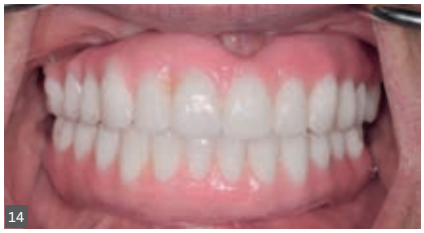
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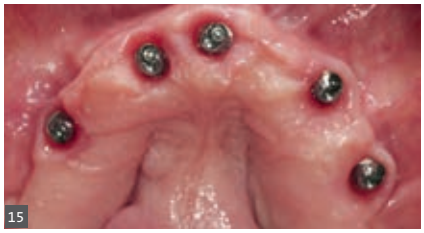
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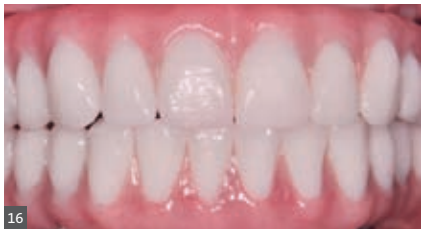
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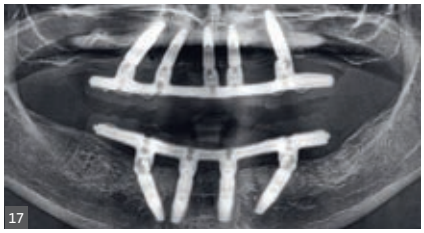
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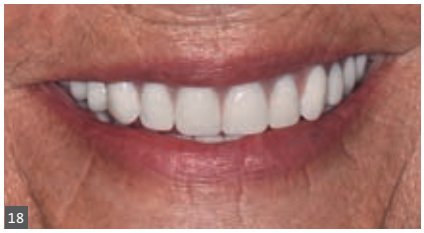
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Straumann® PURE Ceramic Implant

Implant insertion through the DWOS Synergy™ workflow with immediate digital provisionalization

RICHARD ZIMMERMANN
DDS
USA

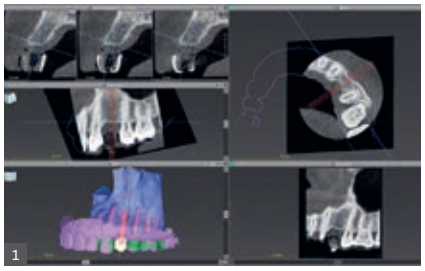
UT School of Dentistry San Antonio

INITIAL SITUATION

A 30 year old female with non-contributory medical history presented to the clinic for evaluation of a maxillary edentulous site. Review of her dental history revealed that tooth #12 (ADA) was lost due to failed endondontic therapy approximately a year ago during her pregnancy and she was now ready to have it replaced. She presented with a high smile line, medium-scalloped gingiva with medium thickness and a desire not to have any metal in her oral cavity. When discussing the various options regarding implant therapy, the patient was very interested in being evaluated for an all ceramic implant. On January 11, the FDA cleared the Straumann® PURE Ceramic Implant for use within the US. Though new to the US, European case documentation has shown excellent osseointegration and soft tissue response. The Straumann® PURE Ceramic Implant is a monotype style implant, meaning the abutment and implant body are one-piece.

TREATMENT PLANNING

The patient was sent to get a computerized cone beam tomography (Morita, USA) of the area and digital diagnostic impressions were taken using an intra-oral scanner (3Shape Trios 3). Once obtained, the DICOMs were imported into the implant planning software (coDiagnostiX™) while the scan files were imported into the laboratory software (Straumann® CARES® Visual) (Figs. 1,2). Since the Straumann® PURE Ceramic Implant are monobody in design and it is not recommend to modify the abutment, the DWOS Synergy™ workflow was utilized to virtually plan this case. DWOS Synergy™ provides real-time communication between the implant planning software (coDiagnostiX™) and the lab software (Straumann®CARES®Visual). This feature improves implant planning by allowing the visualization of the relationship between the proposed implant position and the proposed restoration. Modifications made to the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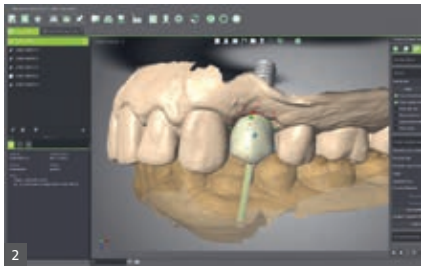
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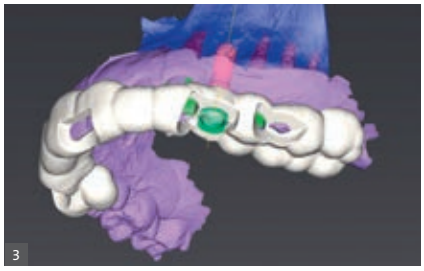
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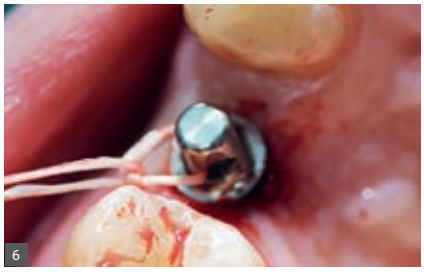
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implant position or restoration design are immediately transferred to the other software, providing instantaneous feedback on how the modification of one affects the other. Of special interest in regard to the Straumann® PURE Ceramic Implant, is that one can design the restoration and ensure that the planned position will not require modification for restorative materials. Once the planning was complete, both the surgical guide and the provisional designs were sent off for fabrication. The guide was sent to a lab to be printed by an Objet30 OrthoDesk (Stratasys) while the provisional file was sent to Straumann Milling Center in Arlington to be fabricated out of polycon ae (PMMA) (Figs 3, 4). During the surgical planning utilizing the DWOS Synergy™ workflow, a Straumann® PURE Ceramic Implant (∅4.1x12mm) was selected with an abutment height of 5.5 mm.

STEFANIE SEITZ

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SURGICAL PROCEDURE

The Straumann® PURE Ceramic Implant design is a combination of the tissue level and bone level implant – the neck of the implant mirrors the Straumann® Tissue Level implant while the implant body mimics the Straumann® Bone Level design (Fig. 5). As such, the surgical protocol for preparing the osteotomy for the PURE is the same as the corresponding Bone Level implant. For this case a guide was used to prepare the osteotomy following the protocol set forth for Bone Level implants given by coDiagnostiX™. Though this case was performed with Straumann Guided Surgery (SGS), a small flap was made to ensure the desired position of the Straumann® PURE Ceramic Implant shoulder. SGS utilizes different combinations of sleeve positions, drill lengths and drill handles to prepare the osteotomy to the correct depth. Sleeves can be placed at three different heights from the implant level (2, 4 or 6mm) based on the case and surgeons preference. The combination of drill length (short, long or extra-long) and drill handle (1mm or 3mm) are determined by the implant planning software which provides the surgical protocol to use at time of surgery. The Straumann® PURE Ceramic

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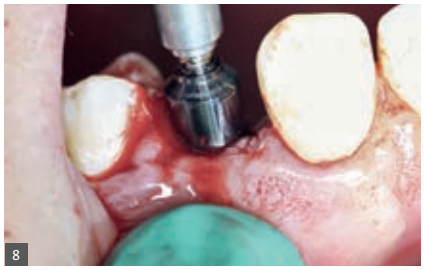

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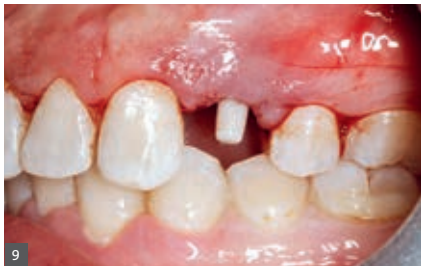

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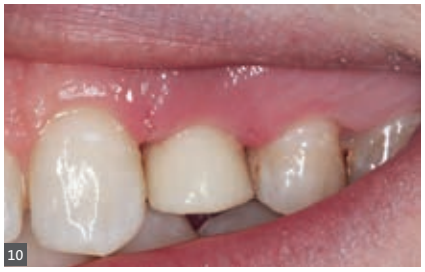

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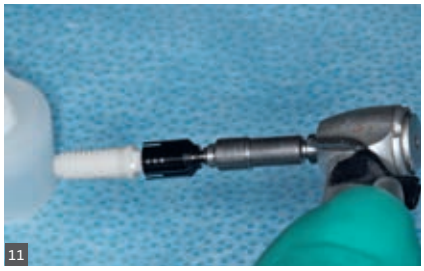

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Implant system uses a series of "position indicators" that aid in ensuring the correct position of the implant during surgery. Both abutment diameters and heights have corresponding position indicators that are placed into the osteotomy for evaluation (Fig. 6). Once the osteotomy has been prepared, typically a surgeon will use a "guided implant", which has a unique driver, to ensure proper placement of the implant. However, the Straumann® PURE Ceramic Implant currently does not have such a driver therefore the surgical guide was only used to prepare the osteotomy while implant placement was performed free-hand. Bone quality was determined to be Type II. The Straumann® PURE Ceramic Implant comes with a separate transfer piece for placement which snaps into place much like the Tissue Level impression cap. Three dots on the driver line up with a flat surface of the abutment portion of the implant and also indicate distance to the shoulder (1, 2 and 3mm). The implant was placed without any incidence to the desired depth and position of the dots (Figs. 7-9). During the healing phase, a protective cap is placed over the abutment to protect it. Since the patient was concerned with esthetics and has a high smile line, it was decided to place a provisional to provide more esthetic appearance. The recommendation by Straumann not to immediately load a PURE implant was taken into account during the DWOS Synergy™ design session by eliminating occlusal and lateral contacts. This provisional was then further modified at time of surgery by further reducing the anatomy and creating more of a custom healing abutment than immediate provisional. The provisional was cemented using temporary cement (TempBond, Kerr) and only two interrupted sutures were required to secure the flap. At the one-week follow up the tissue was healing beautifully around the implant and the patient was scheduled for the final impression seven weeks out (Fig. 10).

FINAL RESULT

The patient was in slight discomfort following the surgery, but stated that this surgery was less painful than the previous extraction. She was pleased to have the modified provisional versus a dark space in her smile.

CONCLUSION

Since the Straumann® PURE Ceramic Implant endosteal portion is based on the Straumann® Bone Level design, it does not require additional surgical instruments or drilling protocols for placement while the specialized transfer piece comes with the implant. When placing the driver onto the Straumann® PURE Ceramic Implant abutment care must be taken to align the indicator dots up with the facets, otherwise incomplete seating of the driver may occur (Fig. 11). As implant therapy has evolved, patient expectations have risen. The desire to have a natural looking, metal-free restoration is increasing as can be seen by the decrease of metal substructures for crowns and frameworks and the increase in ceramic restorations. While titanium can cause a graying of the tissues, the ivory coloring of the Straumann® PURE Ceramic Implant can provide a more esthetic outcome. Another patient was ecstatic to have the option for a Straumann® PURE Ceramic Implant implant since her husband has a titanium implant in the anterior region and she can see the gray. All ceramic implants have the potential to provide greater esthetic outcomes but do require more precise planning and placement. Initially one might consider the Straumann® PURE Ceramic Implant to be limited by design, to a degree it is, however the DWOS Synergy™ workflow can help to reduce the challenge of placing a monotype implant.

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- Increased efficiency with new prosthetic portfolio

In combination with:

Roxolid®

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straumann
simply doing more

Straumann® Bone Level Implant

Esthetic tooth replacement

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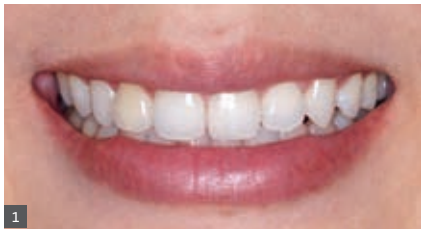
INTRODUCTION

Self-Directed Learning (SDL), a process by which individuals take the initiative – with or without the assistance of others – in diagnosing their own learning needs and formulating learning goals, has been identified as an essential skill for clinicians. As dental clinicians, our busy patient schedules and time constraints prevent us from updating our knowledge with regular CE courses. SDL is therefore fundamental in meeting the challenges of today's dental care environment, helping us to learn more and to learn better, as a "lifelong learning" process for acquiring both clinical skill and knowledge on our own.

I would like to thank Straumann Thailand for organizing such an excellent campaign with the "Dental Implant Esthetic Competition", the first ever regional dental implant competitive award for Thailand or Asia. It provided me with the opportunity to write up and evaluate my patient's case report for the competition. Writing a case report is a good example of SDL since I have to organize the manuscripts systemically by reviewing the patient's chart record, radiography and photos, and self-evaluation is part of the outcome. Not only was I updating my awareness of the literature and my knowledge in order to provide the optimal treatment plan, but processing the completed consent form correctly was an additional benefit for me when collecting the legal documentation prior to publication.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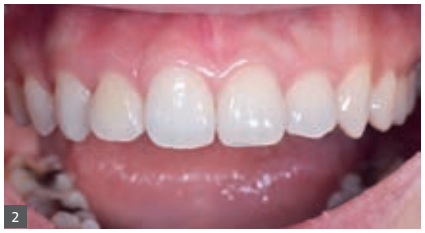
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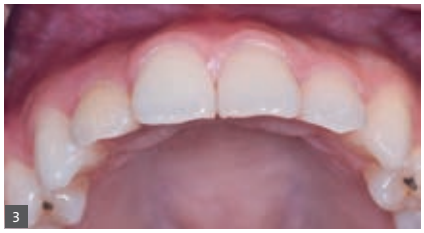
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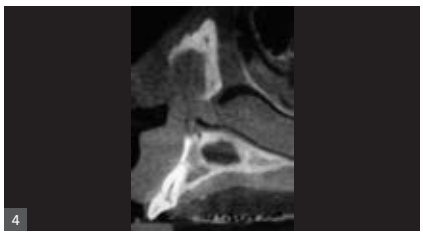
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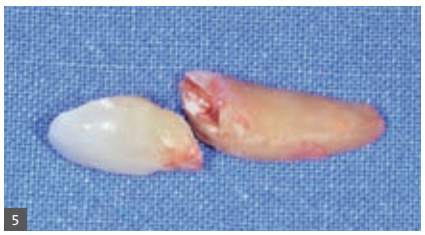
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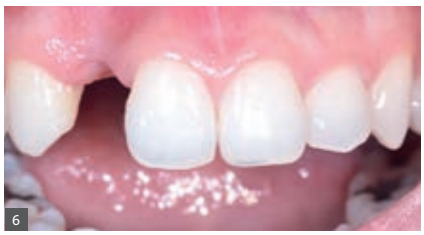
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SDL is an important expertise for all dental clinicians since its main purpose is to enhance individuals' knowledge and clinical skill. Dental clinicians who pursue SDL are continually developing and, more importantly, constantly acquiring new knowledge and skills for the rest of their lives. As for me, the SDL clinician, I realize that the better I properly document my patient/case report and clinical photos, and the more new knowledge I acquire, the better clinician I become since I am able to learn from my mistakes and experiences and am willing to improve and learn more as a lifelong learning process.

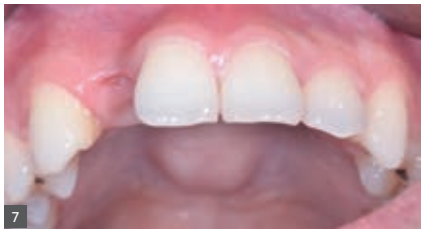
« SELF-DIRECTED LEARNING IS FUNDAMENTAL IN MEETING THE CHALLENGES OF TODAY'S DENTAL CARE ENVIRONMENT, HELPING US TO LEARN MORE AND TO LEARN BETTER, AS A 'LIFELONG LEARNING' PROCESS FOR ACQUIRING BOTH CLINICAL SKILL AND KNOWLEDGE ON OUR OWN »

INITIAL SITUATION

The following case report describes the management of replacing a maxillary lateral incisor with a hopeless prognosis with the Straumann® Bone Level Implant to achieve "a natural look and feel" for the patient. The replacement of a missing anterior tooth with an implant-supported prosthesis has become an accepted treatment modality. It counts as one of the greatest challenges in dentistry since it must meet functional requirements and satisfy patients' high esthetic demands in this visible area. A 36-year old woman presented with the principal complaint that her front tooth was broken. The patient was aware that her tooth had a bad prognosis and desired a single-tooth implant replacement. She was very concerned about the final esthetic result and her expectations were extremely high **(Figs. 1-3)**.

TREATMENT PLANNING

Tooth #12 had a complicated crown-root fracture at sub-gingival level. The existing coronal structure was attached with gingival tissue. Intra-oral examination showed the tooth was discolored with 2 degrees of mobility. Minimal discomfort was reported. The gingival tissue presented with very thin biotype.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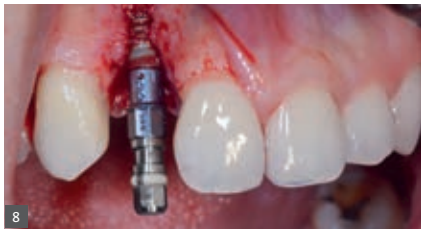
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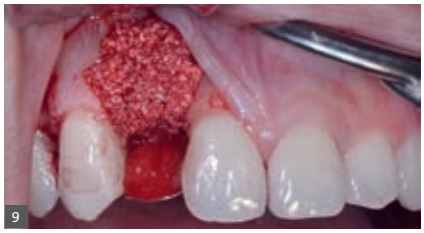
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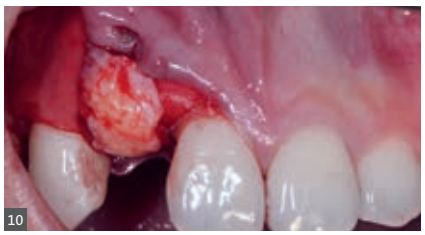
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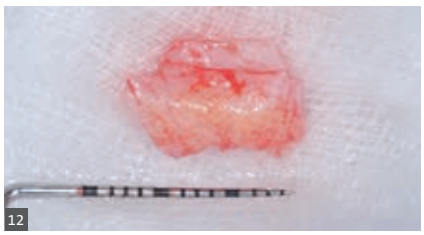
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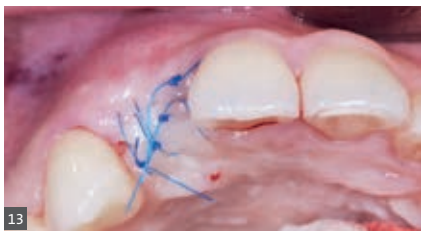
Radiographic and CT examination revealed the root fracture at the cervical third and deficient labial plate thickness. The diagnosis was “crown root fracture with pulp involvement” **(Figs. 4, 5)**. Several options were discussed with the patient regarding management of the tooth. Risks and benefits were explained. The patient agreed that the treatment of choice was extraction of the tooth followed by a dental implant. Type II implant placement was planned since the condition of the labial plate and the tissue biotype were compromised, however the palatal bone was thick enough to place the implant in a 3D position without any need for ridge preservation at the time of tooth extraction. The patient was informed of the compromised esthetic result due to the thin labial plate thickness and gingival tissue biotype.

SURGICAL PROCEDURE

Prior to extraction of tooth #12, an acrylic partial denture was fabricated as a temporary prosthesis. Atraumatic tooth extraction was performed but the labial plate was still lost about 8 mm from the gingival margin. The immediate denture was then delivered. The extraction socket had been left for 8 weeks to achieve soft and hard tissue healing **(Figs. 6, 7)**. A Straumann® Bone Level Implant NC (Narrow Neck CrossFit®, Ø 3.3 mm, L 12 mm) was submerged in the site of #12 with a bone graft followed by surgical guide and CT evaluation **(Figs. 8, 9)**, and a soft tissue graft was then performed to achieve the proper thickness **(Fig. 10)**. The acrylic partial denture was adjusted so there was no undue load on the implant during the healing period. The patient was told to maintain good oral hygiene. After a twelve-week healing period **(Fig. 12)**, a second soft tissue graft was performed to achieve optimal soft tissue thickness again **(Figs. 11-14)**. The second-stage surgery was then completed for healing abutment delivery 8 weeks later **(Figs. 15, 16)**.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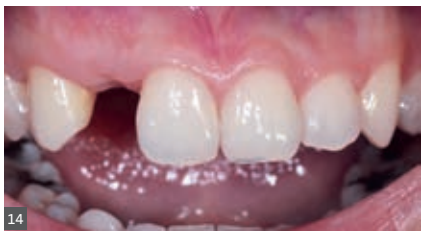
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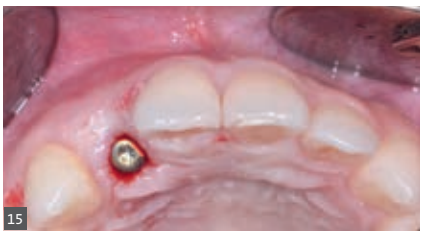
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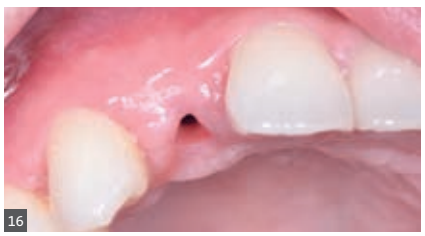
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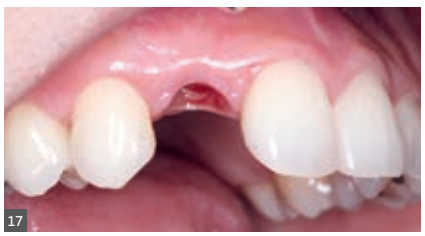
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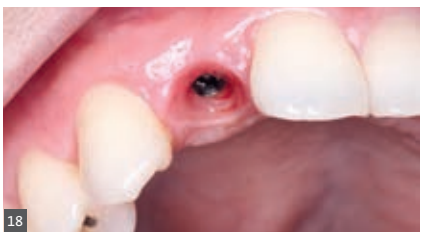
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PROSTHETIC PROCEDURE

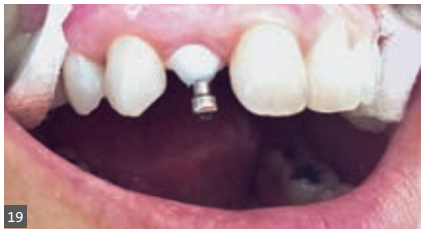
About 5 months after implant placement, the implant was seen to be well osseointegrated with a satisfactory soft tissue profile and was ready for the implant prosthesis. An impression was taken at fixture level for the temporary abutment and crown. They were then delivered to create an optimal soft tissue emergence profile around the implant **(Figs. 17, 18)**. The dental implant fixture and abutment used in this patient are the original Straumann components for ensuring consistent quality through high-precision manufacturing.

FINAL RESULT

Six weeks later, the surrounding soft tissue had acquired an esthetic and natural profile. The customized impression coping was then fabricated and taken at implant fixture level for the final prosthesis **(Fig. 19)**. The zirconia abutment had been carefully selected and prepared and the ceramic crown of the implant (IPS e.max) was then delivered **(Figs. 20, 21)**. The patient was extremely happy with the final result at the three-week follow-up **(Figs. 22, 23)**.

ACKNOWLEDGMENTS

Bangkok Hospital Dental Center
Atraumatic tooth extraction by Dr. Jarinda Thaisangsa-Nga
Implant and soft tissue surgery by Assistant Prof. Pintippa Bunyaratavej
Prosthetic work by In-House Dental Lab (Thailand): Mr. Uthai Mhudvongse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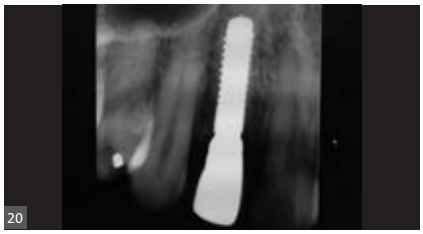
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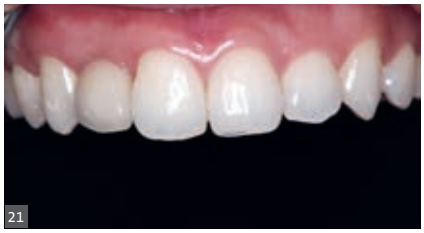
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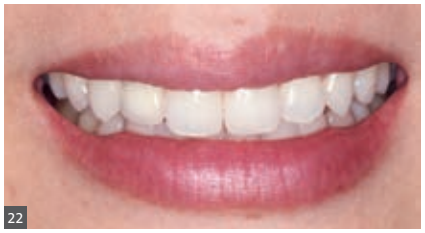
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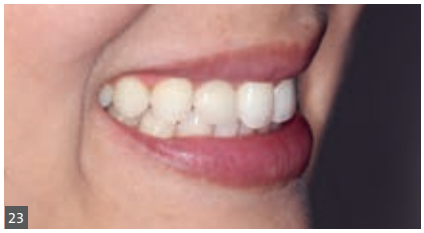
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Guided surgery using a 3D-printed drill template

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AUSTRIA

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INITIAL SITUATION

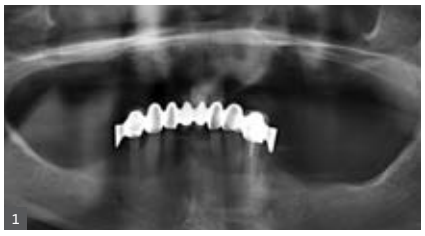
This female patient with an edentulous maxilla presented at the Dental Clinic of the DPU in Krems, Austria, in January 2014 requesting implant provision. After a comprehensive history was taken and her dental situation assessed (maxilla complete denture, mandible front tooth bridge from 34-44 and model cast with Preci attachments), the general conditions for her management were analyzed during the initial visit. She declined any form of bone augmentation and very specifically requested a solution similar to that for her mandible (Preci attachment).

TREATMENT PLANNING

The patient opted for a complete maxillary denture supported by Dolder bars and 4 implants in the area 14, 12, 22, 24 (Straumann® Bone Level Roxolid® Implant). A drill template that allows fully guided implant insertion is required for optimal utilization of the existing bone stock. In a backward planning process, after DVT images were recorded the maximum possible angulation between implants and abutments was calculated. At the same time, the removal of a previously undiscovered root remnant in the area of 21 was planned. This had remained undetected to date due to the spinal overlap on the OPG **(Fig. 1)**.

SURGICAL PROCEDURE

The printed drill template (BEGO) was prepared on the basis of the DVT findings, digital 3D planning of the implants (coDiagnostixTM) **(Fig. 2)** and digitalization of the plaster models, and the guide sleeves were polymerized in the template **(Fig. 3)**. The root remnants were removed **(Fig. 4)**, the gingiva was blanked off **(Fig. 5)** and the mucosal fragments removed **(Fig. 6)**. The respective implant bed was then prepared and the drill template adjusted with fixing pins.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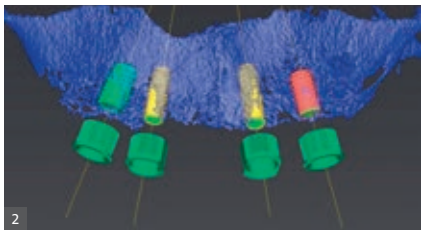
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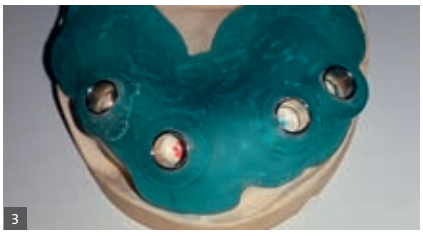
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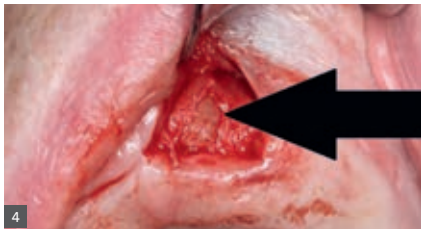
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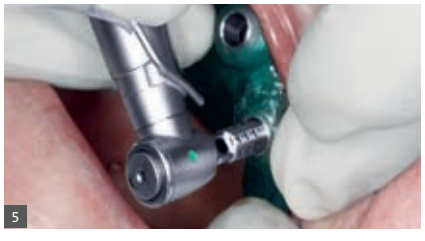
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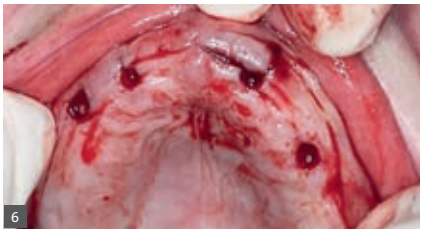
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In order to ensure the primary stability of the implants, and after lateral bone condensation through the guide sleeves with osteotomes **(Fig. 7)**, the implant bed was prepared up to the planned implant diameter **(Fig. 8)**. Tapping was deliberately avoided in this case in order to optimize stability. Following the guided insertion of the implants **(Fig. 9)**, the flaps were closed and 1.5% chlorhexidine-digluconate gel was applied. The extraction site was managed with two interrupted sutures. At the follow-up visit after 10 days, both the extraction site and all 4 gingival incisions had healed satisfactorily.

PROSTHETIC PROCEDURE

After a healing period of 4 1/2 months, the implants were re-opened and gingival formers inserted. After 10 days, gum tissue had grown around the formers and an open impression was taken as the basis for subsequent management. The precision of the model was checked at a later visit using a plastic bar. This was followed by a try-in of the new denture in order to determine the exact amount of space available and, in particular, the maximum height of the bar. At the next visit, the fit of the milled Dolder bar was checked in order to prevent tension between the implants and to ensure an optimal fit of the new denture **(Fig. 10)**. After final corrections were made to the tooth position, the denture was produced in plastic **(Fig. 11)**.

During the fitting of the complete denture, the occlusion was ground, and a decision was taken provisionally to insert only 2 of the 4 Preci attachments to make it easier for the patient to become accustomed to the denture. After a further 3 weeks all the internal components were fitted.

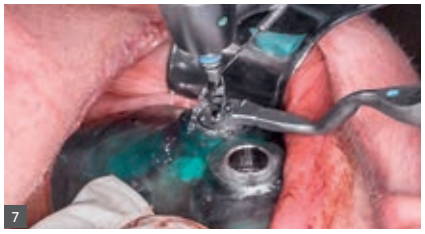
FINAL RESULT

When DVT-assisted templates were used, the deviation of the implant was found to be 0.43 mm in position and 4 degrees in angulation. For operations with templates that rest on the mucosa, a deviation of 0.7 - 0.9 mm is reported, whereas teeth-supported drill templates show a higher degree of precision. In this operation, the average angular deviation was 1.78 degrees, while the average 3D offset at the implant base and implant tip was 0.63 mm and 0.89 mm respectively, i.e. within the desired range. This was checked using the treatment evaluation tool (coDiagnostix) **(Fig. 12)**.

CONCLUSION

Backwards planning as an essential element, digital planning and guided implantation with a printed drill template facilitated the precise, adequate positioning of the implants. This is a method which, under supervision and regardless of the clinical experience of the dentist, can lead to a predictable, satisfactory result.

This case was realized with the support of Prof. Dr. Constantin von See, Head of the “CADCAM Center and Digital Technologies” (Zentrum CADCAM und digitale Technologien), DPU, Krems, Austria.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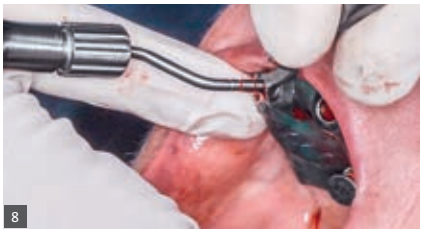
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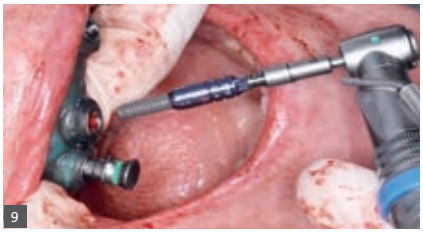
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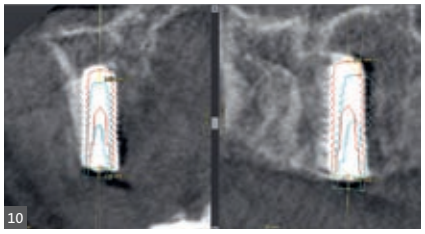
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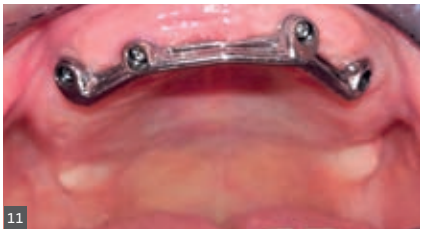
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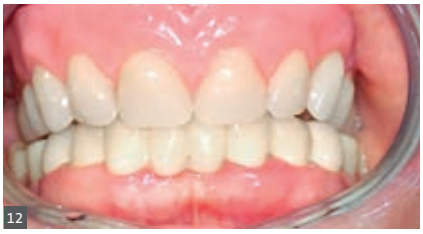
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Straumann® Novaloc® Retentive System for hybrid dentures

A reliable connection that endures

DIAMONDS ARE FOREVER...

There are moments in life when you want a connection to be extremely reliable. Until now hybrid denture attachment systems may have been pushed to their limits in challenging implant situations. But now there's Novaloc® ...

The Novaloc® Retentive System for hybrid dentures offers an innovative carbon- based abutment coating (amorphous diamond-like carbon) with excellent wear resistance, overcoming up to 60° implant divergence. Both a straight and 15° angled abutment, available in various gingival heights, cover a broad range of clinical implant situations. Together with its durable PEEK matrices, the Novaloc® Retentive System provides a reliable connection that lasts. This results in low maintenance and high patient comfort. Let your patients profit from the endurance of a reliable treatment solution.

DIAMONDS ARE FOREVER...

As the name implies, “amorphous diamond-like carbon” (ADLC) is a class of carbon bonds displaying several of the desirable qualities of a diamond. ADLC coatings are commonly used in the medical device field (e.g. hip joints) and reduce abrasive wear, prolonging the lifetime of the medical appliance.

Straumann® Novaloc®
Retentive System

Surface
Carbon-based coating offering diamond-like properties

Performance
Excellent material, delivering high wear resistance

Flexibility
Flexibility to compensate implant divergence

Usability
Convenient component handling

Patient comfort
Less hassle, more comfort for your patient

ORIGINAL
Rely on the original Straumann® connection

Retentive System

SURFACE

ADLC[1] coatings offer several of the desired qualities of a diamond:

- hardness
- wear resistance
- sleek surface

USABILITY

Novaloc® Abutment, straight and angled

- compatible with the standard SCS Screwdriver:
  - one tool fits all
  - self-retaining system preventing aspiration
- gingiva height and implant platform laser marked on abutment for clear identification
- available on all Straumann implant platforms (RN, WN, NNC, RC, NC)
- 6 gingiva heights for the straight abutment
- 5 gingiva heights for the angled abutment

FLEXIBILITY

Novaloc® Abutment, 15° angled

Restore situations with high implant divergence:

- align a common prosthetic insertion axis up to 60° implant divergence
- reduce unilateral stress and wear

PATIENT COMFORT

- matrix audibly and tangibly snaps into place, ensuring correct seating of the prosthesis
- angled abutments align the prosthetic insertion axis enabling exact insertion
- small SCS drive mechanism of the straight abutment reduces accumulation of debris

ORIGINAL

Rely on the original implant-abutment connection

- Perfectly matching components
- Excellent service and support

PERFORMANCE

In combination the materials PEEK[2] and ADLC[1] contribute to:

- excellent wear resistance
- exceptional long-term performance
- low maintenance
- low friction between abutment and matrix

- PEEK[2] matrix inserts offer excellent chemical and physical properties
- matrix accommodates up to 40° prosthetic insertion between two implants
- 6 retention strengths offer optimal adjustment of the denture retention
- matrix housing available in titanium or color-neutral PEEK[2]

[1] ADLC: Amorphous diamond-like carbon
[2] PEEK: Polyether ether ketone

Interview

"The outstanding quality of the product is noticeable straightaway."

ALBIN GYGLI

Albin Gygli, Global Product Manager at Straumann Headquarters in Basel/Switzerland, was a member of the core team in the Novaloc® development project.

« THE NOVALOC® SYSTEM IS ACTUALLY AIMED AT ANYONE WHO WORKS WITH HYBRID DENTURE SOLUTIONS: CLINICIANS, DENTAL TECHNICIANS AND, LAST BUT NOT LEAST, PATIENTS – THEY ALL BENEFIT FROM LOW LEVELS OF MAINTENANCE AND HASSLE, RESULTING IN GREATER COMFORT AND THUS A BETTER QUALITY OF LIFE FOR THE PATIENT. »

The Straumann® Novaloc retentive system for hybrid dentures is a new product in the portfolio of the Straumann® Prosthetic System. How did this come about?

Albin Gygli: Every new Straumann product must serve a very specific purpose: it must provide our customers with clear added value – for example in terms of handling or additional indications, thereby providing their patients with the best possible experience with their implant-based solutions. The key words when it comes to hybrid dentures are maintenance and longevity. The former should be minimized and the latter maximized. This interests and affects everyone involved: the dentist fitting the implant, the dental technician and, of course, the patient. Our Novaloc® Retentive System is specifically designed to satisfy these requirements.

So what properties does Novaloc® offer?

Albin Gygli: In a nutshell: thanks to its surface texture, the Novaloc® abutment offers unmatched wear resistance, thereby facilitating durable, reliable use in challenging indications. The matrices are made of PEEK[1], a biocompatible high-performance polymer with excellent properties in terms of mechanical and chemical resistance.

What exactly is the correlation between surface roughness and longevity in the context of hybrid dentures?

Albin Gygli: The obvious correlation is that a smooth abutment surface is less abrasive against the retention inserts and thus contributes to longevity. The comparison between the physical properties of various coatings underlines the high performance of our ADLC[2]-coated abutment. The roughness of a surface area is indicated by the roughness parameter Ra. The smaller this parameter, the smoother the surface. ADLC, the surface coating used for the Straumann® Novaloc® Retentive System, has shown an Ra of 0.01 in tests, i.e. up to 9 times lower than the values determined for other abutments used in hybrid dentures (see figure below). Expressed as a percentage: the roughness of Novaloc® is 89% lower than that of titanium nitride[3].

The ADLC coating of the new Novaloc® retentive system – a really fascinating material. Can you go into a bit more detail?

Albin Gygli: DLC stands for "Diamond-Like Carbon" and exists in various forms that come with some of the typical properties of a diamond – hardness, wear resistance and a sleek surface – which in turn forms the basis for longevity. ADLC is one of these manifestations, in chemical terms a-C:H. So we have amorphous carbon presenting a mixture of graphitic sp^2 and sp^3 bonded carbon atoms[4]. DLC is already broadly used in the medical device industry but, to our knowledge, has not been used for a dental abutment to date.

One of the most obvious aspects: its color. Why is it so and are other colors available?

Albin Gygli: You can have any color you want, as long as it's black – to quote Henry Ford. Seriously, the specific color is determined by the carbon-based coating and its molecular composition.

Have you received any initial feedback from the market?

Albin Gygli: Dentists and dental technicians who work in the implant field and who have already examined the product, or even implanted it in patients, are enthusiastic: the outstanding quality of the product is noticeable straightaway, as soon as you hold it in your hand. The interaction between the matrix and abutment, based on their physical properties, and the excellent handling have been very positively welcomed by our test subjects.

Why is an angled abutment needed?

Albin Gygli: The angled insertion of an implant may be required, for example, in cases where only a small amount of bone is available. Where straight abutments approach their limits, the angled abutment is the ideal solution in such situations. It provides a common insertion axis for the prosthesis, reduces unilateral loading of the abutments and ultimately provides the patient with an agreeable experience in terms of implant integration.

Who is the Novaloc® retentive system aimed at?

Albin Gygli: For all the reasons outlined above, it can be concluded that the Novaloc® system is actually aimed at anyone who works with hybrid denture solutions: clinicians, dental technicians and, last but not least, patients – they all benefit from low levels of maintenance and hassle, resulting in greater comfort and thus a better quality of life for the patient.

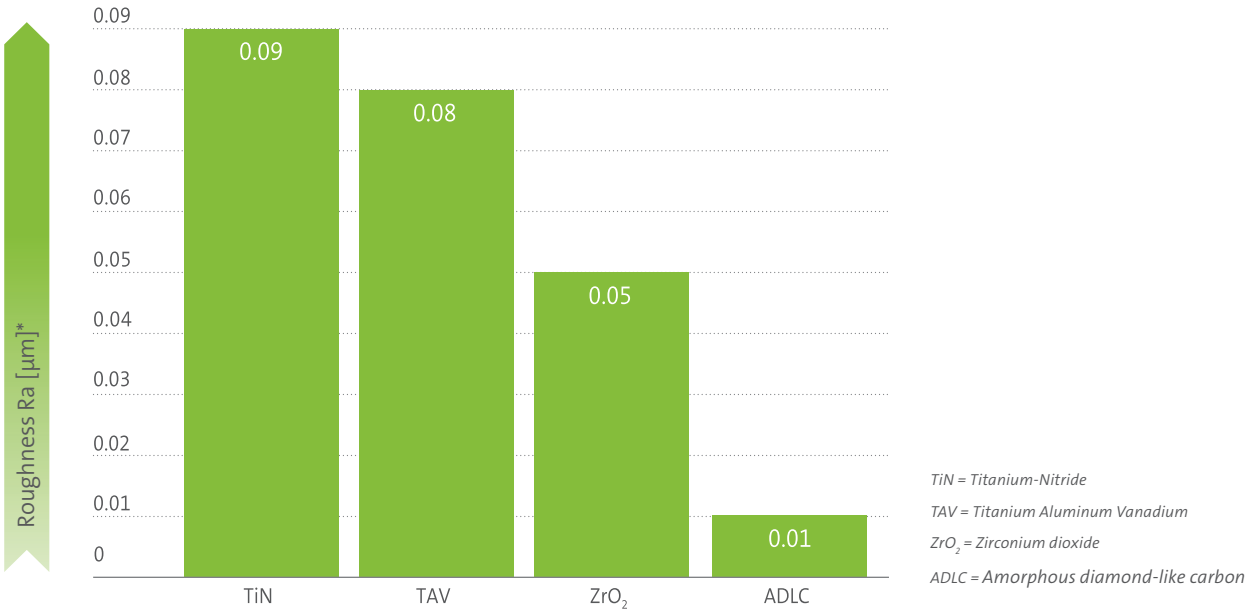
[1] PEEK: Polyether ether ketone

[2] ADLC: Amorphous diamond-like carbon

[3] In internal roughness tests titanium nitride (Tin) showed an Ra of 0.01 (data on file).

[4] Sp^2 carbon bonds describe a trigonal-planar molecular structure, like that in graphite, whereas sp3 corresponds to the tetrahedral structure found in diamonds.

Surface roughness (Ra) of retentive abutments for hybrid dentures*



* The comparison between the physical properties of various coatings underlines the high performance of the ADLC (amorphus diamond-like carbon) abutment coating. Clinicians, dental technicians and more importantly patients benefit from: less maintenance, less hassle and therefore more comfort. The chart below shows the different surface roughness (Ra) values of retentive abutments for hybrid dentures (data on file). The roughness of a surface area is indicated by the roughness parameter Ra – the smaller the parameter value the smoother the surface. A smooth abutment surface is less abrasive against the retention inserts and contributes to longevity.

Straumann® Emdogain®

Orchestrating wound healing and oral regeneration

Straumann® Emdogain® is one of the best documented products in oral tissue regeneration. Its excellent clinical tolerability has been demonstrated in over two million surgical applications. Emdogain® contains enamel matrix proteins (amelogenins). When applied to the wound, these proteins form an extracellular matrix that stimulates cells and processes that are fundamental for wound healing . These properties make Emdogain® a unique solution to stimulate and accelerate the healing of wounds and regeneration of tissues.

After celebrating the 20th anniversary of Emdogain® since it was launched on the market in 1995, Straumann is now setting new milestones in the area of oral tissue regeneration by extending the use of Emdogain® to improve soft tissue wound healing in oral surgical procedures and dental implantation procedures in general.

20 YEARS IN THE FIELD, MORE THAN 2 MILLION PATIENTS TREATED

With 20 years of market experience and over 2 million patients treated, Straumann® Emdogain® can be considered as one of the best established biologics in the dental market. The product is excellently researched and extremely well tolerated, and its reliable, easy and safe application has turned it into the gold standard when it comes to biologically inducing and stimulating the periodontal regeneration of intrabony, recession and furcation defects.

NEW APPROVED INDICATION: THE STIMULATION OF SOFT TISSUE WOUND HEALING

From the earliest days of market experience it soon became evident that the proteins in Emdogain® have a broader biologic function and stimulate and modulate healing in a more general way. The ability to stimulate periodontal regeneration might only be a consequence of this broad biologic stimulation. Likewise, early clinical observations have indicated that the product has great potential to stimulate the wound healing of soft tissues. In 1999, the inventors of Emdogain® patented the use of enamel matrix derivative, the active principle in Emdogain®, as a wound healing agent. To date, around 150 scientific publications and reviews have described the effect of enamel matrix derivatives on wound healing and soft tissue wound healing, and the unique properties to stimulate wound healing have led to the clinical establishment of a treatment to cure hard-to-heal wounds like diabetic foot ulcers with excellent clinical results. Recent scientific publications clearly demonstrate the potential of Emdogain® to induce faster reepithelialization, faster wound closure, faster resolution of inflammation and faster and extended blood vessel formation.

« EMDOGAIN® IS A REALLY UNIQUE PROTEIN MIXTURE. IT INFLUENCES A NUMBER OF DIFFERENT CELLS AND A NUMBER OF DIFFERENT PROCESSES. IT REALLY HELPS THE WOUND HEALING AND WOUND CLOSURE IN THE ORAL CAVITY. »

PROF. DAVID COCHRAN
USA

« EVERYBODY WHO IS CREATING A WOUND IN THE ORAL CAVITY, FOR INSTANCE IN THE CONTEXT OF CONVENTIONAL PERIODONTAL SURGERY, CONNECTIVE TISSUE HARVESTING, TOOTH EXTRACTION OR EVEN IMPLANT PLACEMENT CAN USE EMDOGAIN® TO IMPROVE EARLY WOUND HEALING. IN FACT, IT IS THE ONLY PRODUCT ON THE MARKET WHICH CAN BE USED FOR THIS INDICATION, BUT I HAVE THE IMPRESSION THAT NOT MANY CLINICIANS ARE AWARE OF THIS! »

PROF. ANTON SCULEAN
SWITZERLAND

CUSTOMER SURVEY: 85% OF USERS CONFIRM THAT EMDOGAIN®

improves soft tissue wound healing. The excellent clinical outcomes related to the quality of soft tissue wound healing when using Emdogain® were recently confirmed in an international market survey carried out in the U.S., Germany, Italy and Brazil. The results from this survey were remarkably consistent, showing that >85% of current Emdogain® users agree with the statement that Emdogain® improves soft tissue wound healing. More than 2/3 of the users agreed that the ability of Emdogain® to stimulate wound healing would translate into a potential benefit of the product in soft tissue procedures in general.

EMDOGAIN® AS A STANDARD STEP IN IMPLANT SURGICAL PROCEDURES

This strong scientific evidence and the market input from experienced users have encouraged Straumann to strive for new milestones in the field of implant dentistry and oral tissue regeneration. As the first dental implant company to do so, Straumann will incorporate a biologic in the surgical procedure of implant placement as a standard step in order to improve wound healing.

The properties of Emdogain® have the potential to render procedures less prone to complications and to increase patient satisfaction by **a.** allowing faster healing and recovery, **b.** reducing the level of post-surgical discomfort (pain and swelling) and **c.** increasing the quality of the outcomes of esthetic procedures in implant dentistry.

DISTINGUISH YOUR PRACTICE BY MEETING YOUR PATIENTS' REQUIREMENTS. ADOPT EMDOGAIN® TO ACHIEVE PATIENT SATISFACTION.

- Oral surgeries always bear the risk of undesired suffering of your patients such as pain and swelling of the soft tissues or wound healing complications – Emdogain® can increase your patients' tolerance of surgical interventions by reducing these unwanted side effects.
- The goal of every surgical procedure around teeth or dental implants is to restore the natural soft tissue architecture and esthetics for your patient – Emdogain® supports the soft tissue build-up and formation of keratinized gingiva necessary to achieve pleasing esthetic results.
- After any surgery, your patients suffer from discomfort and reduced quality of life – Emdogain® accelerates the healing process, which reduces the length and impact of surgery on your patients' daily life.

INCREASE THE QUALITY OF LIFE OF YOUR PATIENT BY USING STRAUMANN® EMDOGAIN®

Your primary goal is to create a functional and esthetically pleasing restoration for your patient. Unfortunately, surgical interventions used to achieve this always bear the risk of complications such as pain, swelling and discomfort.

You can increase your patients' acceptance and tolerance of oral surgery by:

- **Informing the patient about possible undesired effects of the procedure**
- **Applying surgical techniques that reduce invasiveness**
- **Using additional products to improve healing, reduce pain, swelling, the risk of infections and wound complications.**

Scientific literature: www.straumann.com/stargetref

ROLL-OUT FROM APRIL 2016

Straumann launched the new application in April 2016, starting in Europe, with an official indication. The registration of the technology in other countries outside Europe is currently ongoing. Since the product's potential to stimulate wound healing is clearly documented, Straumann is committed to work with key opinion leaders and clinical experts to establish the new usage in the key target indications, ranging from invasive to esthetic indications. Likewise, the combination of Emdogain® with existing products like the new Straumann® Bone Level Tapered Implant for esthetic and immediate indications, or with existing solutions like the Pro-Arch technology, will form the focus of our work to further improve these and other solutions for the benefit of our clinicians and patients.

The use of Straumann® Emdogain® in two different clinical scenarios in the same patient

GEORGE FURTADO GUIMARÃES
DDS
BRAZIL

Private dental surgeon, Brasília, Brazil. Lecturer and Researcher in Implantology and Periodontology, São Leopoldo Mandic Institute and Research Center, Brasília, Brazil. Coordinator of Specialist Training and Master's degree, São Leopoldo Mandic Institute and Research Center, Brasília, Brazil. Co-authors: James Carlos Nery PhD, Silvio Arouca MSc

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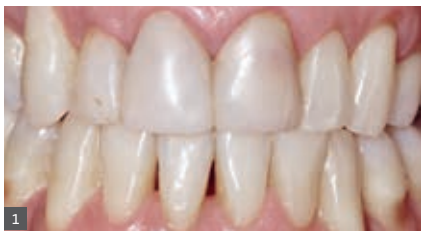
INITIAL SITUATION

A 49-year-old man was referred to our service for evaluation and treatment of gingival recession with root exposure (FDA, tooth 13) and a tooth with a hopeless prognosis because of root resorption (tooth 11) **(Fig. 1)**. After comprehensive examination, no significant health problems and no contraindications for periodontal and implant surgery were detected. For tooth 13, clinical measurements and observations resulted in a diagnosis of a Miller class I recession. For tooth 11, CBCT images **(Figs. 2, 3)** revealed a bucco-lingual bony defect secondary to previous endodontic surgery in very close proximity to the nasopalatine canal. Although they were not the patient's main complaint, some esthetic issues were observed in the adjacent teeth.

TREATMENT PLANNING

For the Miller class I recession of the canine, a substantial amount of good quality keratinized tissue was observed at the gingival margin. Consequently, a coronally advanced flap approach was planned, combined with the use of Emdogain®. Regarding the central incisor, a minimally invasive extraction with immediate implant placement and immediate temporization were planned. The bony defect would be addressed using a block bone graft from the posterior mandible. Additionally, nasopalatine content removal was also considered in order to prevent future contact between the implant and that anatomic landmark. Topical application of Emdogain® was envisaged for both situations with the aim of optimizing wound healing.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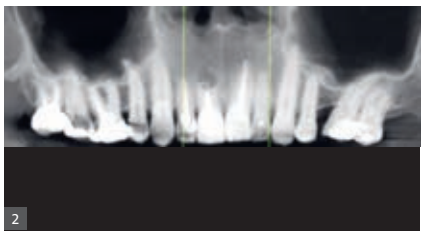
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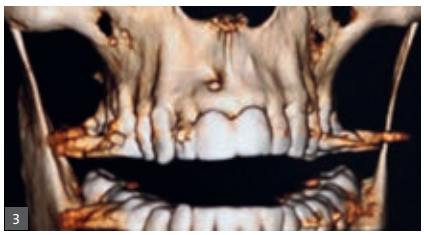
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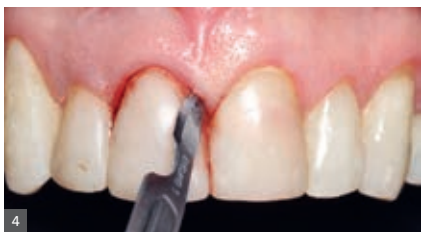
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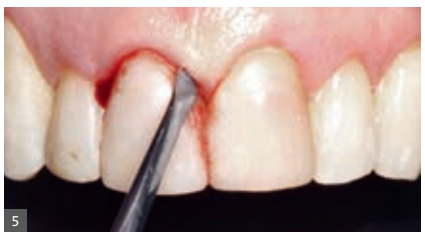
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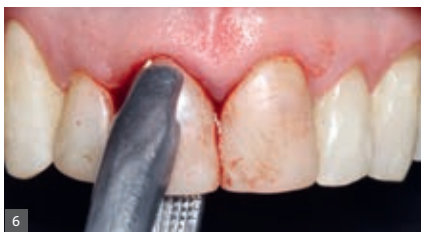
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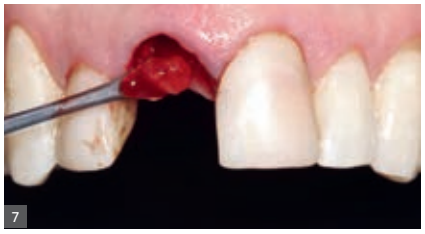
SURGICAL PROCEDURE

Tooth 11: After local anesthesia, an intrasulcular incision was made all around the tooth with a 15C surgical blade **(Fig. 4)**. A periotome was used to sever both the supracrestal fibers and the interproximal periodontal ligament fibers **(Fig. 5)**. A forceps was carefully applied with slow rotational movements to luxate and extract the tooth (Fig.6). Every effort was made not to jeopardize the remaining buccal plate. Lucas curettes were used to remove all granulation tissue **(Fig. 7)**. The communication between the alveolar socket and the nasopalatine canal **(Fig. 8)** was confirmed, and all the soft tissue contents in the canal were enucleated using round carbide burs **(Fig. 9)**. The implant was placed against the palatal wall so as to achieve sufficient torque for immediate temporization **(Fig. 10)**. Subsequently, the bone donor site was accessed. A full-thickness incision was made 3 mm below the mucogingival junction from the ascending ramus of the mandible to the distal aspect of the first molar. A flap was raised, and bone blocks measuring 8 mm and 6 mm in diameter were removed using trephine burs **(Fig. 11)**. Sutures were placed. At the implant site, a 6-mm diameter bone block was used to completely fill the nasopalatine canal. Two further blocks were used to repair the buccal and lingual bony defects. The blocks were positioned in a press-fit manner until they were completely stable **(Fig. 12)**. The residual gap was filled with autogenous bone particles. Interrupted sutures were placed in the interdental papillae only. An abutment was selected for a cemented provisional crown, and temporization was performed based on an ideal crown prototype **(Figs. 13, 14)**. Tooth 13: After local anesthesia, an intrasulcular incision was made from the base of the recession to the point where it meets the vertical incisions. Two oblique, bevel incisions were made with a 15C surgical blade mesially and distally to the intrasulcular incision and extended beyond the mucogingival line, creating a trapezoid flap. An initial partial-thickness flap of the interproximal papilla was made using a Beaver® mini blade **(Fig. 15)**, and a full-thickness flap was then raised apical to the recession up to the mucogingival line. Subsequently, a partial-thickness dissection was made apical to this line to promote a tension-free coronal displacement of the flap **(Fig. 16)**. The interproximal papillae were de-epithelialized with microsurgical scissors **(Fig. 17)**. Following soft tissue management, tooth decontamination was performed with Gracey curettes and special burs. A 24% EDTA gel (Prefgel®) was applied to the root surface for 2 minutes and then completely rinsed off with sterile saline. Emdogain® was then applied to the entire root surface **(Fig. 18)**. The flap was positioned coronally above the cementoenamel junction, and a 5.0 nylon suture was carefully placed **(Fig. 19)**. Upon completion of the surgical procedures, Emdogain® was topically applied to the soft tissue manipulated during surgery (teeth 13 and 11) with the aim of enhancing soft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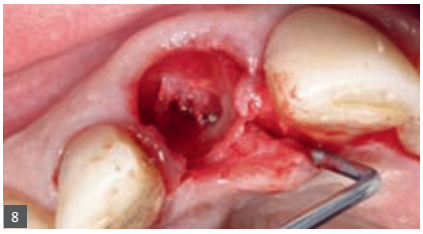
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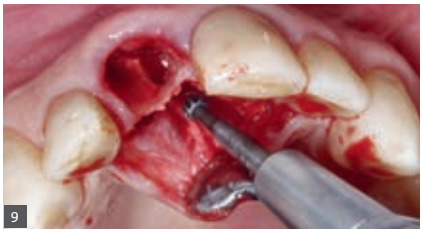
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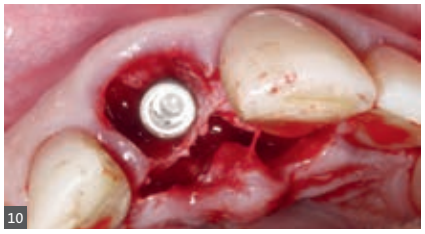
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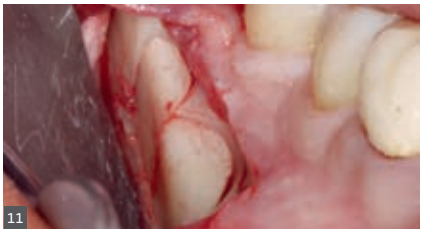
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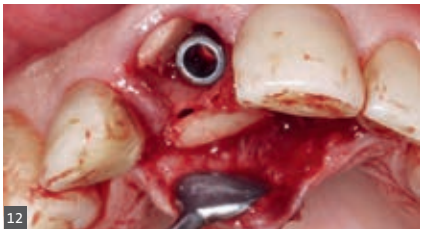
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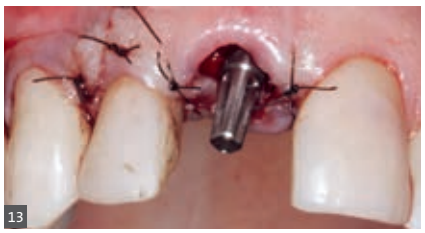
tissue healing **(Fig.20)**. The patient was instructed not to rinse or brush his teeth on the day of the surgery to prevent early loss of the Emdogain® gel. Sutures were removed 14 days postoperatively, at which time the healing process was assessed **(Fig.21)**, and new hygiene instructions were issued. The prosthetic phase was also scheduled at this stage.

PROSTHETIC PROCEDURE

After a healing period of 3 months, the prosthetic procedure was performed. In accordance with the patient's wishes and esthetic needs, teeth 21 and 12 were also prepared **(Fig. 22)**, and individual temporary crowns were made. A tooth-whitening procedure was also carried out (Procedure, products) in both upper and lower arches to optimize the final esthetic outcome. At the time of impression-taking, the abutment torque was confirmed and a customized impression coping was used to copy the resulting profile obtained with the temporary crown. Individual zirconia-ceramic crowns were made and permanently fitted **(Figs. 23, 24)**.

FINAL RESULT

During the first two weeks postoperatively, the patient was followed up every other day to ensure that adequate healing was taking place. Aspects related to inflammation, infection, re-epithelialization of the surgical incisions and soft tissue maturation were assessed. Satisfactory postoperative wound healing was achieved without complications. The combination of a coronally advanced flap and Emdogain® proved to be a good treatment option for this Miller class I case, which resulted in a positive outcome. Immediate implant placement with immediate temporization promoted a satisfactory initial result for the patient. Topical Emdogain® application aided in wound healing, based on the angiogenic properties previously reported by the authors themselves (Guimarães et al. 2015). Although a considerable number of surgical sites were involved at the same time, the patient was highly satisfied and reported no postoperative pain. Regarding the restorative aspects of this case, which was the patient's main concern, a highly satisfactory esthetic result was obtained. The tooth-whitening procedure and the zirconia-ceramic crowns were key to achieving such goals, in terms of both esthetics and function.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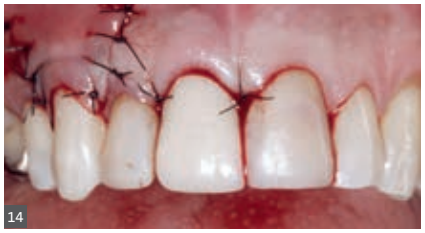
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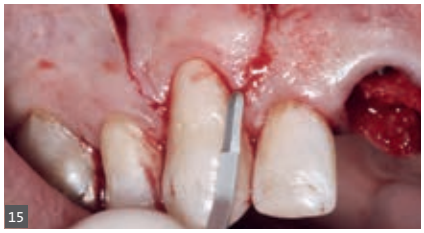
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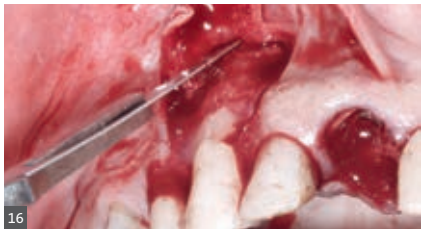
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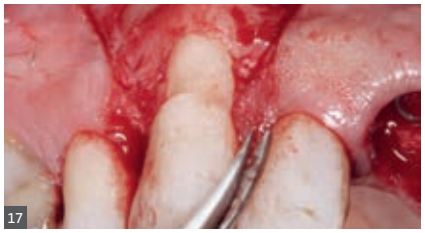
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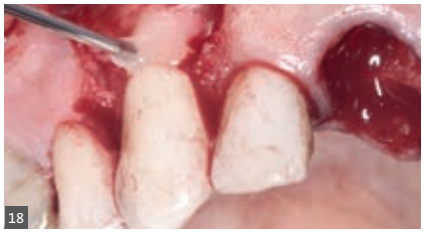
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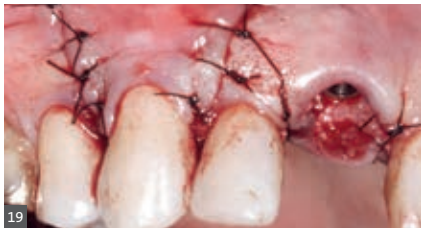
CONCLUSION

Gingival recession cases are often challenging, especially in the context of immediate implant placement. Careful treatment planning is therefore crucial to a positive long-term outcome. Treatment combining a coronally advanced flap and Emdogain® in the case presented here permitted complete root coverage and satisfactory esthetics. Both the grafted alveolar bony defects and the nasopalatine canal content enucleation were regarded as predictable and important for long-term implant performance. Immediate implant placement and temporization to replace the central incisor provided the patient with good immediate esthetics and contributed to the preservation of the soft tissue architecture during the healing phase which, in turn, was paramount in the final restoration.

This case was realized with the support of Dr. James Carlos Nery, PhD, and Silvio Arouca, MSc.

« MY PERSONAL RESEARCH ON USING EMDOGAIN® FOR THE WOUND HEALING AS PART OF DENTAL IMPLANTATION PROCEDURES DEMONSTRATED THAT THE PRODUCT STIMULATES BLOOD VESSEL FORMATION AND THEREFORE ENHANCES WOUND HEALING. USING EMDOGAIN® IN MY DAILY IMPLANT AND GRAFT CASES MAY OPTIMIZE MY WOUND HEALING RESULTS AND CONSEQUENTLY MY PATIENT'S SATISFACTION. »

GEORGE FURTADO GUIMARÃES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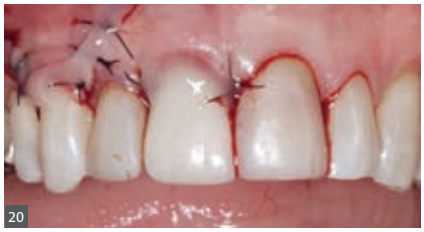
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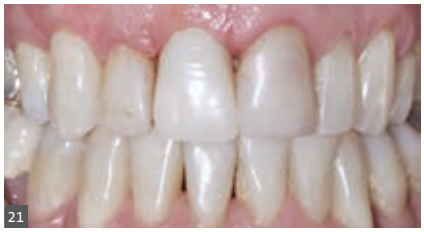
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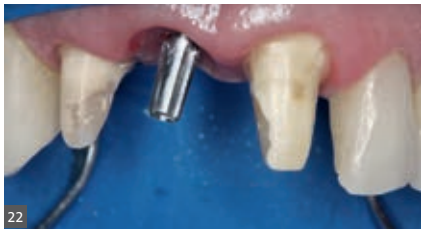
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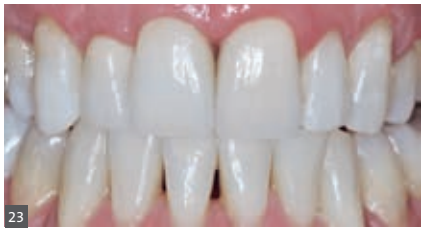
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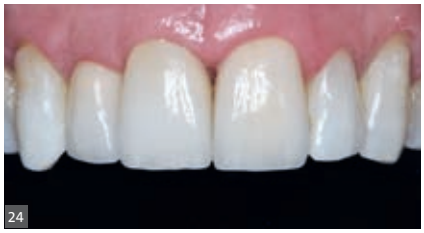
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Straumann® Emdogain®

From a Swedish biotech lab to gold standard in periodontal tissue regeneration

«I HAVE BUILT MANY THEORIES IN MY LIFE. I AM HAPPY THAT THIS ONE WORKED! »

PROF. LARS HAMMARSTRÖM

Since its introduction twenty years ago, more than 2 million patients around the world have been treated for periodontal disease with Emdogain®, which has not only become the gold standard in periodontal tissue regeneration, but is also one of the best researched dental treatments currently available.

Twenty years have passed since Emdogain®'s market launch by Biora AB, a Swedish start-up company founded by Prof. Lars Hammarström of the Karolinska Institute Dental School in Stockholm, Sweden.

"After two months the hole was filled with nicely attached cementum and also periodontal ligament!" (about the first application of EMD in an animal model)

Prof. Lars Hammarström

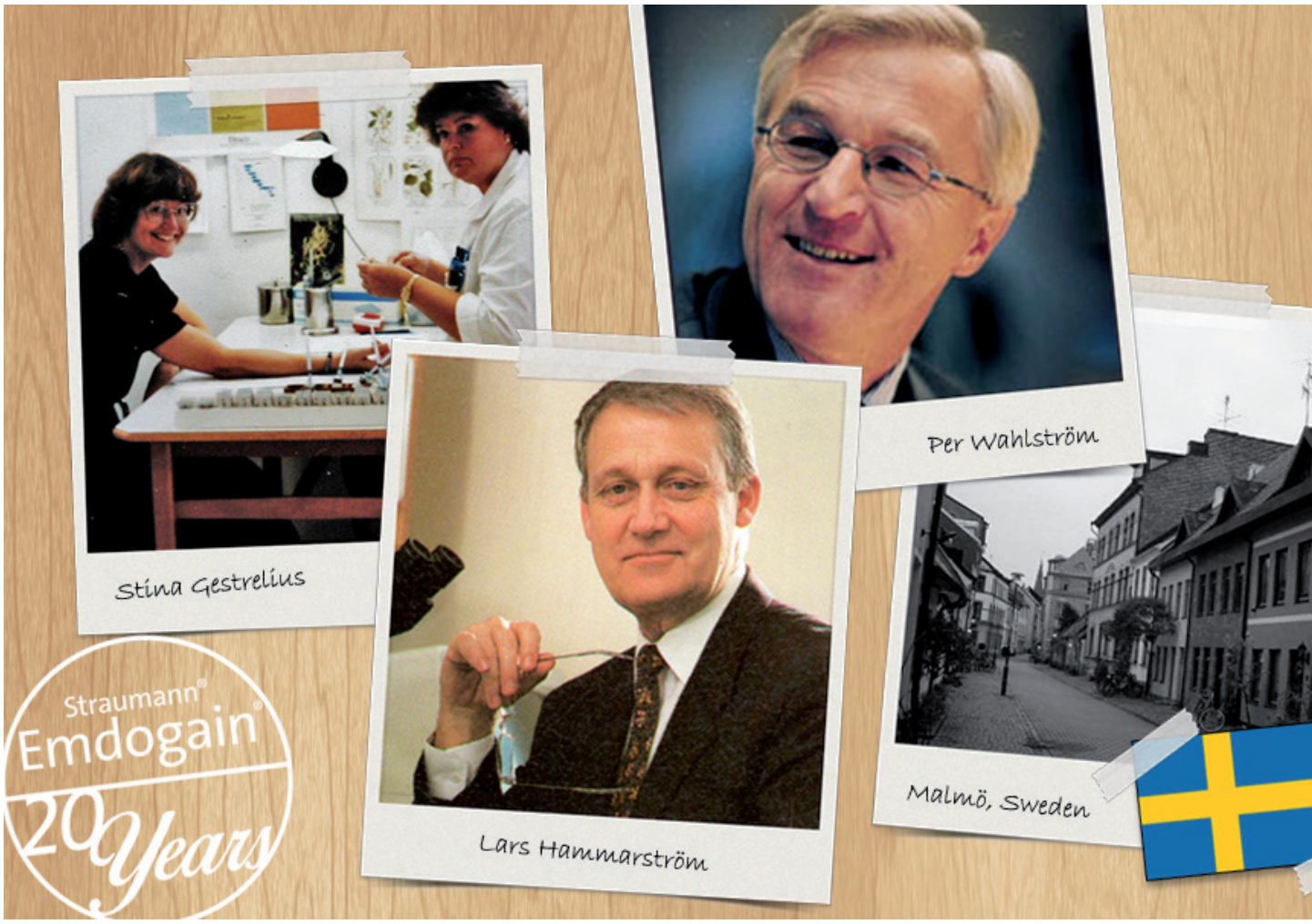
Recently, we had the privilege to interview both Prof. Lars Hammarström as well as Dr. Stina Gestrelius, who was in charge of research and development at Biora AB and therefore played a very important part in making Prof. Hammarström's idea become a commercial product.

Where did the idea of Emdogain come from?

Prof. Lars Hammarström: As you know, in the 1980s membranes were the only treatment option for periodontal regeneration. Although membranes work, they represent a mechanical approach. I wanted to bring an alternative, biological approach to the dental treatment. While doing research at the Karolinska Institute, I had observed that in some animals, there is a thin layer of enamel which extends between the dentin and cementum. This led me to the hypothesis that enamel related proteins induce cementum formation.

How did you test your idea?

Prof. Lars Hammarström: My team and I went to the slaughterhouse in Stockholm and got some lower jaws from pigs that were being processed for the meat industry. We scraped off the enamel in the early stages of development, when the mineral content is low and the consistency is like Philadelphia cream cheese, making it very easy to remove. We dispersed it in physiological saline solution. We then made a groove at the surface of the root of an animal model, put a little bit of the enamel protein solution in the groove and repositioned the soft tissue. After two months the hole was filled with nicely attached cementum and also periodontal ligament!



How did your idea become a product?

Prof. Lars Hammarström: After this initial breakthrough, I wanted to get a patent on my discovery and hopefully launch a regenerative dental product based on it. I was fortunate enough to meet Per Wahlström, who was just starting Euroventures Nordica, a venture capital company. When I explained my concept, he was keen to collaborate with me and that is how I got some starting capital. We then established Biora AB in 1987 and started a collaboration with Ferring, a big pharmaceutical company in Malmö, Sweden, with a very good reputation for protein chemistry. We gave the enamel matrix to a research group there, of which Dr. Stina Gestrelius was in charge. The aim of the collaboration was for us to get more information for our patent, while Ferring was interested in making a marketable active synthetic peptide out of the enamel matrix. After 9 months of research, Dr. Gestrelius' results showed that, while the matrix as a whole or the full mix of proteins extracted from the matrix had some activity, all subsets of peptides tested showed none – so Ferring lost interest in our collaboration. Fortunately, Dr. Gestrelius agreed to come work for us at Biora AB in 1988.

Dr. Gestrelius, was this a big leap of faith to leave your job at Ferring to work at Biora?

Dr. Stina Getrelius: No, because throughout the 9 months that I worked on EMD, I had seen it work. I also knew the people behind this project and trusted that we could make a product out of it.

> "Emdogain is based on biomimicry – a very academically smart principle."
>
> Prof. Dr. Nicholas Lang

How was your collaboration?

Prof. Lars Hammarström: Dr. Gestrelius brought her experience of good laboratory practice and registration. She was very important for the development of the product and when we had collected enough material to apply to the registration authorities in Europe and also in the United States, she was very instrumental. We were able to register the product both in Europe and the USA, even though it was unusual for an animal protein to be used in humans.

PROF. LARS HAMMARSTRÖM

DDS/PHD

Lars Hammarström co-founded Biora AB in 1986. He was the director of the College of Oral Biology at the Karolinska Institute from 1992 to 1998, and served as professor of Oral Pathology at the Karolinska Institute from 1975. Prior thereto, Prof. Hammarström was the dean of the Dental School at the University of Lund from 1974 through 1975. Dr. Hammarström holds a D.D.S. in Dentistry and a Ph.D. in Pharmacology from the Karolinska Institute's School of Dentistry in Stockholm, Sweden.

What evidence did you need to collect?

Dr. Stina Gestrelius: Immunological studies were crucial to demonstrate that there was no risk of allergic or immunological reactions. Actually, before formally starting any studies, many of us at Biora performed skin-prick tests on ourselves with EMD to see if this would generate any reactions. Because there were none, we started a range of clinical immunological studies. Of course, a wide array of in vitro studies, kinetic and physicochemical studies, in vivo pre-clinical studies, non-clinical safety studies and clinical studies (in collaboration with clinicians such as Dr. Gunnar Heden, Dr. Leif Blomlöf and Dr. Lars Heijl) also had to be performed.

What was the best moment?

Dr. Stina Gestrelius: The entire experience was very interesting. But probably the highlights were when we received the European registration (CE mark) in 1995 and the FDA approval in 1996. Both of these events made national news in important newspapers in Sweden. That was very exciting.

What was your main hurdle along the way?

Dr. Stina Gestrelius: Financially, it was not always easy. To collect all the required evidence, we needed altogether 7 years and during this time, we needed financial support. We had to be creative to find ways to generate revenues somehow. I feel like we did almost everything possible besides robbing a bank! For instance, we became a service provider of aseptic freeze drying for pharmaceutical companies from 1992 until 1995.

> "I am truly amazed that twenty years later, Emdogain® is still considered an innovative product and is so well looked upon by dentists all over the world. I am very proud of Lars!"
>
> Dr. Christina Hammarström, Prof. Lars Hammarström's wife and pediatric dentist

What were the next steps?

Dr. Stina Gestrelius: As soon as we had the approval, we needed more money to start subsidiaries and marketing activities to promote Emdogain in various markets. We obtained this money through two public offerings – one in Sweden and one in New York City. At its peak, Biora had 6 subsidiaries (in the USA, Germany, Italy, the UK, Switzerland, and the Netherlands) and was

also available through distributors in many countries such as in Japan. We also published our main collective research findings in an issue of the Journal of Clinical Periodontology (Volume 24, Number 9) in September of 1997. We continued to develop the product and to broaden the range of indications in which Emdogain® could be used: intrabony defects, furcation defects and recession defects.

How did the market react during the launch?
Dr. Stina Gestrelius: Because Emdogain® was the first biological product used in dentistry, it was not easy to explain the concept to dentists and this took some time. Nevertheless, year after year, our sales kept growing. I was initially afraid – despite all the tests and studies – that there would be some negative side effects. But there were none. Instead, we started to receive phone calls from clinicians, asking us if we had noticed the good wound healing, which occurs when Emdogain® is used. We had not. We did more research on this topic and applied for a patent which was later licenced to Mölnlycke for use in extra-oral wounds.

Today, Emdogain is 20 years old, still the gold standard in periodontology and helped to save the teeth of over 2 million patients. How do you feel about this?
Dr. Stina Gestrelius: I am very happy, of course.
Prof. Lars Hammarström: I am very happy as well. I have built many theories in my life. I am happy that this one worked!

DR. STINA GESTRELIUS

PHD

Stina Gestrelius was responsible for research and development and a vice president at Biora AB from 1988 until 2003. Previous to that, she worked for several pharmaceutical companies such as Novo Nordisk, Astra and Ferring. She is now the CEO of Sigrid Science, a consulting firm within life science. Dr. Stina Gestrelius holds a Ph.D. in biotechnology from the University of Lund in Sweden.

One of the first Biora Emdogain® ads

Collagen membranes in regenerative dental medicine

INTRODUCTION

Guided tissue and guided bone regeneration (GTR, GBR) are well-established techniques in dentistry to augment lost tissue around teeth and dental implants respectively (Nyman et al. 1980, Karing et al. 1980, Nyman et al. 1982, Dahlin et al. 1988). The basic principle of these methods is the placement of a barrier membrane between the soft tissue and residual bone in order to prevent the fast-proliferating epithelial cells from populating the bony defect and to provide space and time for the migration of slow-dividing osteogenic or periodontal ligament cells into the defect area.

In the course of the evolution of GTR and GBR techniques, different types of membranes have been developed. Today, commercially available barrier membranes for GTR or GBR procedures can be divided into either non-resorbable or resorbable membranes. Non-resorbable membranes, which were first introduced in the dental field, are primarily made of titanium and polytetrafluoroethylene (PTFE, expanded PTFE and dense PTFE) and maintain their structural integrity over the entire healing period.

Despite their successful use in many clinical indications, primary soft tissue closure for certain defects remained challenging and additional surgery to remove the device after the desired healing time was inevitably required (Zucchelli and Mounssif 2000, Wang et al. 2000). On the contrary, bioabsorbable membranes, either of synthetic (aliphatic polyesters) or natural (collagen) origin, are metabolized by hydrolysis or enzymatic activity respectively, and thus are completely resorbed over time, increasing patient comfort.

REQUIREMENTS, TYPE AND CHARACTERISTICS OF A BARRIER MEMBRANE

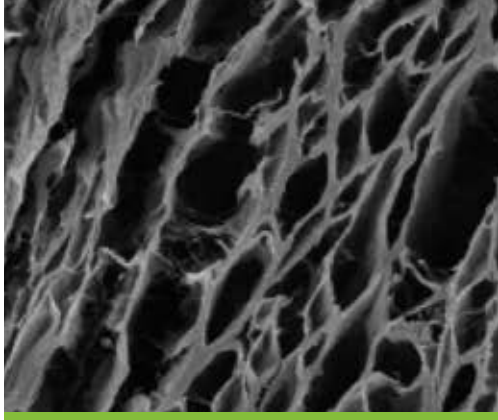
Practically speaking, a barrier membrane designed for dental indications should meet the following criteria: host tissue integration, biocompatibility, cell occlusiveness, permeability for nutrients and ease of use (Hardwick et al. 1994). Since collagen is a major and highly conserved protein found in the connective tissues of all mammals, thus offering a high level of homology, different collagen membranes for GTR or GBR procedures of animal origin have been engineered. From 28 different collagen types that have been identified in vertebrates, collagen type I is the most prevalent and best-described member of the entire family (Shoulders and Raines 2009, Fratzl 2008, Kadler et al. 2007). In humans, collagens cover ~30% of the absolute protein content of the body and can be found in all tissues and organs such as skin, bone, tendon, etc. They are important proteins involved in numerous biological activities including extracellular matrix- and blood vessel formation, cell adhesion and migration, as well as tissue morphogenesis and repair (Kadler et al. 2007, Sakar et al. 2012). They are present as elongated fibers, network-forming collagens, and fibril-associated collagens or as transmembraneous collagen domains (Shoulders and Raines 2010, Fratzl 2008) and give stability and elasticity to the tissue by their remarkable tensile strength. Collagen molecules are synthetized by different cells, such as endothelial (Howard et al. 1976) or smooth muscle cells (Schlumberger et al. 1991), but predominantly by fibroblasts (Silvipriya et al. 2015).

DEGRADATION OF COLLAGEN AND ITS FUNCTION IN TISSUE REMODELING AND WOUND HEALING

Specific proteases (collagenases) regulate the cleavage of collagen molecules. With their characteristic catalytic domains they are able to decompose the molecule into defined fragments. Degradation and biosynthesis of collagen are essential steps for several processes. Unlike other substances or compounds used for tissue engineering approaches, natural collagens are very effective biomaterials due to their fast adaptation to mechanical forces and the transformation of information into biomechanical signals, thereby controlling several events e.g. tissue remodeling or wound healing (Chang and Buehler 2014). Collagens also play a major role in hemostatic reactions. Platelets harbor cell surface-exposed collagen-specific receptors and binding of a ligand induces degranulation and blood clotting. Hence, collagen aids in wound stabilization and for this reason has been widely used as a hemostatic agent and biological dressing in medicine and pharmacology (Patino et al. 2002, Nuyttens et al. 2011). In addition, it acts as chemoattractant for different cell types involved in the wound healing process, including gingival and periodontal ligament fibroblasts (Postlethwaite et al. 1978). When exposed to the oral cavity during healing time, collagen is rapidly degraded in a non-inflammatory manner, making the use of collagen membranes possible even in challenging flap procedures (Schwarz et al. 2006).

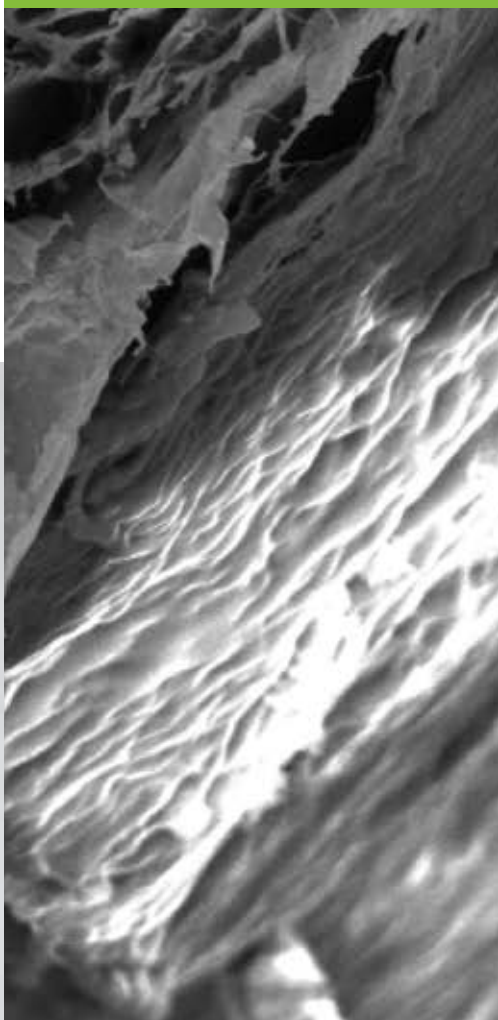
COLLAGEN MEMBRANES FOR GBR/GTR IN DENTAL MEDICINE

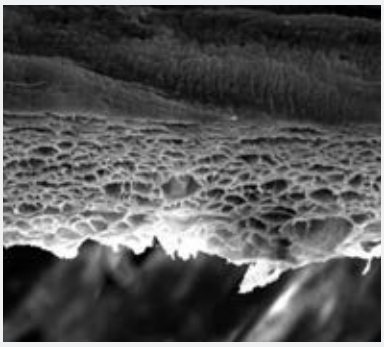
Collagen membranes used in dental medicine derive mostly from tendon, dermis, skin or the pericardium and are commonly of bovine or porcine origin (Bunyaratavej et al 2001). They can be manufactured by different techniques. In general, the collagen fraction is first isolated, then purified and precipitated by changing the ionic strength, the pH value or by increasing the temperature followed by an air evaporation step. At the end, the purified collagen is freeze-dried and sterilized (Patino 2002).



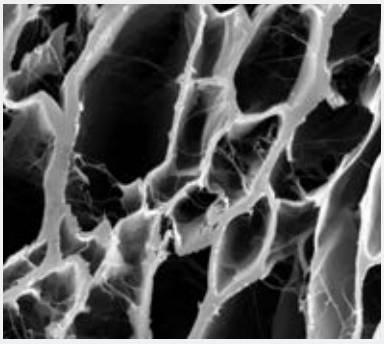
JASON® MEMBRANE AND COLLPROTECT® MEBRANE – TWO MEMBRANES IN THE STRAUMANN BIOMATERIALS PORTFOLIO

botiss Jason® membrane and botiss collprotect® membrane – two collagen membranes available in the Straumann Biomaterials portfolio – are made of porcine collagen type I and III. Both membranes are produced in a standardized multi-stage cleaning process that removes all cellular and non-collagenic components, while preserving the native three-dimensional and open porous collagen structure. In this regard, tolerance studies as well as clinical trials have proven their biocompatibility (Rothamel et al. 2012, Barbeck et al. 2015, Merli et al. 2015, Panagiotou et al. 2015).





Jason® membrane: dense three-dimensional collagen scaffold.

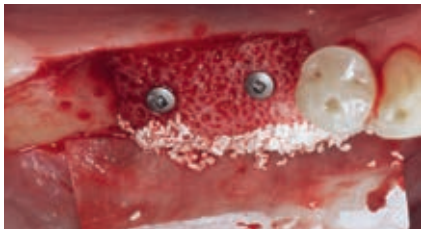


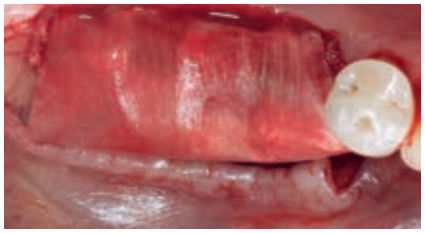
Jason® membrane: open porous structure.

MECHANICAL BEHAVIOR AND DEGRADATION TIME OFFER UNPARALLELED RANGE OF TREATMENT OPTIONS

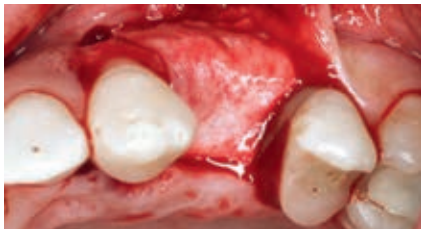
Even though they derive from the same animal species, Jason® membrane and collprotect® membrane differ in their mechanical properties and resorption behavior, since they originate from different porcine tissues. Jason® membrane derives from the porcine pericardium, a fibrous tissue sac that surrounds the mammalian heart. The pericardium prevents overexpansion of the heart and contains small amounts of serous liquid, enabling free mobility of the heart muscle during blood volume changes. Since the pericardium has to withstand the forces of the heart muscle, it has an exceptionally dense collagenic structure, which confers rigidity and a multi-directional tear resistance as well as tensile strength to the membrane. Thus, in bone augmentation procedures, Jason® membrane undergoes slow enzymatic degradation and consequently provides an extended barrier time, making this membrane suitable for the treatment of larger defects, such as extended ridge augmentations and sinus floor elevation with additional lateral augmentation. Extended bony defects require a prolonged healing time as the complete resolution of the defect is dependent on the rate of blood vessel formation and recruitment of bone-forming cells, which starts at the edges and proceeds to the center of the defect area (Schenk et al. 1992).

Conclusively, the dimension of the defect ultimately determines the time a membrane is desired to maintain its barrier function (Zellin et al. 1995). Accordingly, smaller and medium-sized defects such as fenestrations or periodontal lesions require a membrane with intermediate barrier time, provided by the collprotect® membrane showing a faster degradation compared to Jason® membrane. The collprotect® membrane is made of porcine dermis and has an open porous, but also a dense collagen network. The inherent open pores of the native porcine skin facilitate the migration of blood vessels into the defect area, hence allowing a rapid vascularization of the underlying wound bed (Rothamel et al. 2011), while the density of the membrane maintains a barrier against soft tissue ingrowth.





Covering of a large augmentation with Jason® membrane (vertical reconstruction with maxgraft® bonebuilder and cerabone®), Dr. Anke Isser.

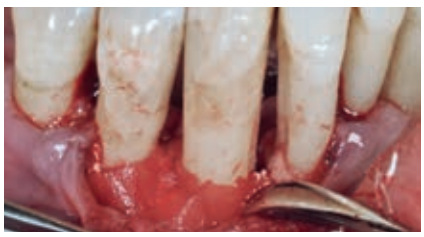


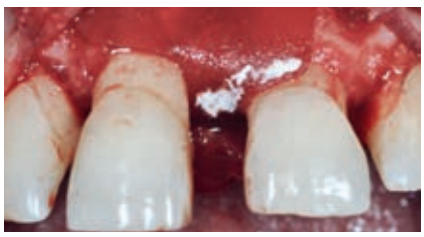
Covering of grafting material and implant with Jason® membrane (horizontal augmentation with cerabone® and Jason® membrane, Prof. Dr. Dr. Daniel Rothamel).

Aside from their different performances as mechanical barriers, Jason® membrane and collprotect® membrane further differ in their thickness. Jason® membrane has a low thickness of about 0.2 mm and facilitates soft tissue manipulation especially in thin biotypes. collprotect® membrane is slightly thicker (~0.4 mm) and may be the material of choice for augmentation with autologous or allogenic bone. These kind of grafts usually completely remodel in 3 to 4 months and therefore do not require a prolonged barrier function. Similarly, barrier membranes with intermediate barrier times, such as collprotect® membrane, are also adequate for the treatment of periodontal bone defects.

PERIODONTAL REGENERATION FOLLOWING TREATMENT WITH BARRIER MEMBRANES

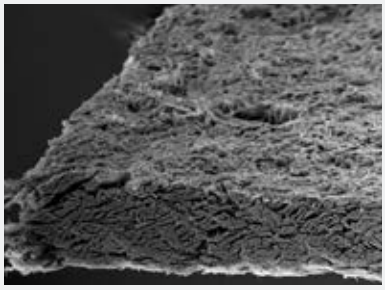
Resorbable collagen membranes have been successfully used to treat periodontal intrabony lesions and furcation defects. Compared to conventional flap surgery, an average gain of clinical attachment (CAL) of 1.1 mm to 1.58 mm was achieved when a collagen barrier membrane was placed between the gingival epithelium and the residual intact periodontal ligament (Needleman et al. 2002, Needleman et al. 2006, Stoecklin-Wasmer et al. 2013). Moreover, systematic reviews indicate similar clinical outcomes compared to non-resorbable membranes in regenerative periodontal therapy (Laurell et al. 1998, Parrish et al. 2009), however without the drawbacks of non-resorbable material. Because of their stiffness, non-resorbable membranes are prone to flap perforation and increase the risk of soft tissue dehiscence and membrane exposure, impairing the regenerative process and ultimately requiring the removal of the device (Simion et al. 1994, Gher et al. 1994, Watzinger et al. 2000).



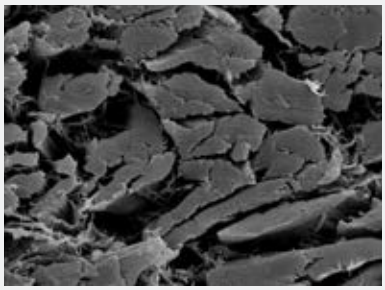


Covering of a small defect with collprotect® membrane (intra-osseous defect augmented with cerabone®), Dr. Raluca Cosgarea.

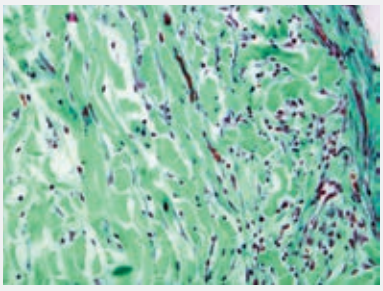
collprotect® membrane – natural structure.



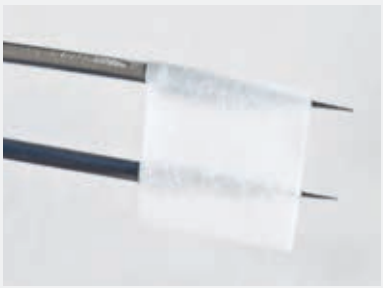
collprotect® membrane – native three-dimensional collagen structure.



collprotect® membrane – dense collagen structure.



Histology six weeks after implantatation of collprotect® membrane: blood vessels have penetrated the porous structure. Collagen fibres are visible and the degradation proceeds without any inflammatory response.



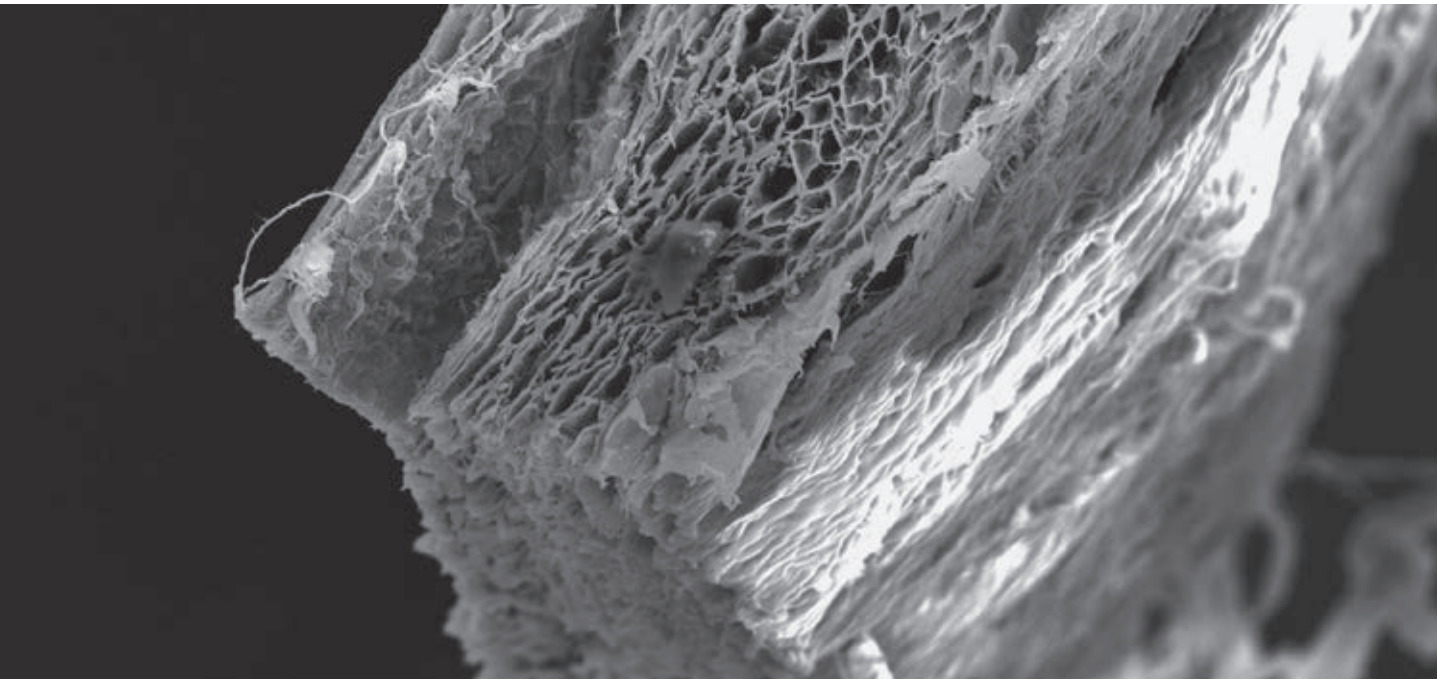
Jason® membrane – highly adaptable behavior.

CONVENIENT MEMBRANE SOLUTIONS DUE TO EXCELLENT HANDLING PROPERTIES

In addition to their mechanical and degradation behavior, the Jason® and collprotect® membrane also feature excellent handling and defect applications. Both materials can be applied wet or dry. In dry conditions, the relative stiffness of the membranes allows upright placement into the defect or socket during filling with particulate bone graft material. Accordingly, after rehydration with sterile saline solution or blood, they become flexible and can readily be placed over the augmentation area and adapted to the surface contours. If needed, repositioning in wet conditions is easily possible without the risk of the membrane sticking to itself. Although both membranes can be pinned, a fixation is unnecessary in most cases due to their excellent adhesion properties. Owing to its exceptionel tear resistance, Jason® membrane can even be sutured or screwed. Likewise, both membranes can easily be trimmed with scissors or a scalpel to fit the defect area.

Modern techniques in dental medicine aim at both optimal tissue regeneration and satisfaction of esthetic concerns. Over the past decades, barrier membranes made of collagen have been demonstrated to be central to achieving these goals. Both the Jason® membrane and collprotect® membrane used in more than 300,000 dental applications exhibit outstanding handling properties, have controlled degradation patterns and are characterized by their excellent biocompatibility, making these membranes the ideal choice for applications in implant dentistry and periodontology.

Scientific references: www.straumann.com/stargetref



Biomaterials@Straumann®.

When one option is not enough.

Decades of experience in dentistry and oral regeneration propelled us to understand and meet the diversity of needs, indications and preferences. The right solution in implantology and periodontology is designed to fit the individual. Straumann offers an exceptional range of biomaterials that meets your expectations and those of your patients.

Ask for options.
Contact Straumann.

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simply doing more

Straumann® Emdogain®/botiss mucoderm®

Mucogingival surgery around teeth and implants in the esthetic zone – why the goal is complete coverage

GIOVANNI ZUCCHELLI

DDS

ITALY

Professor in Periodontology at the University of Bologna/Italy. PhD in Medical Biotechnology applied to Dentistry. Active member of the European Academy of Esthetic Dentistry, Italian Society of Periodontology, Italian Society of Osseointegration, the European Federation of Periodontology and the American Academy of Periodontology. Associate editor and member of the editorial board of the International Journal of Esthetic Dentistry and member of the Editorial Board of the International Journal of Periodontics and Restorative Dentistry. Winner of scientific prizes for research in periodontology in Italy, USA and Europe. Author of more than 100 scientific publications in the field of periodontology. Co-author of two illustrated textbooks on periodontal plastic surgery (Ed. Martina) and of the chapter "Mucogingival Therapy-Periodontal Plastic Surgery" in Jan Lindhe's textbook on "Clinical Periodontology and Implant Dentistry" (Ed. Wiley-Blackwell). Author of the book "Mucogingival esthetic surgery" (Ed. Quintessence)

Gingival recession around teeth and soft tissue dehiscence around metallic implants are common reasons for dissatisfaction among patients. Exposure during smiling or function of portions of the root or implant surface are the main indications for surgical coverage procedures. Generally only the most coronal millimeter(s) of the recession is/are exposed during smiling or function, therefore the presence and/or the persistence of a shallow recession after therapy may be a problem for the patient. Thus, the goal is complete root (or implant) coverage when patients are dissatisfied with the esthetic appearance of their teeth or implant(s).

HOW TO ACHIEVE COMPLETE COVERAGE – INSIGHTS FROM THE LITERATURE

1. Recent systematic reviews and consensus reports on root coverage procedures[1,2] concluded that the addition of autologous connective tissue graft (CTG) or Emdogain® (EMD) under a Coronally Advanced Flap (CAF) are the procedures of choice to achieve complete root coverage as they both have extensive evidence showing that they significantly improve root coverage compared with CAF alone.

2. A split mouth, randomized clinical trial[3], has shown that treatment of gingival recession defects with either CAF+CTG or CAF+ EMD appears stable, clinically effective, and similar to each other on all measured parameters, even after 10 years. Because the CAF+EMD procedure avoids the need for a CTG harvesting procedure, it is the preferred treatment of most patients.

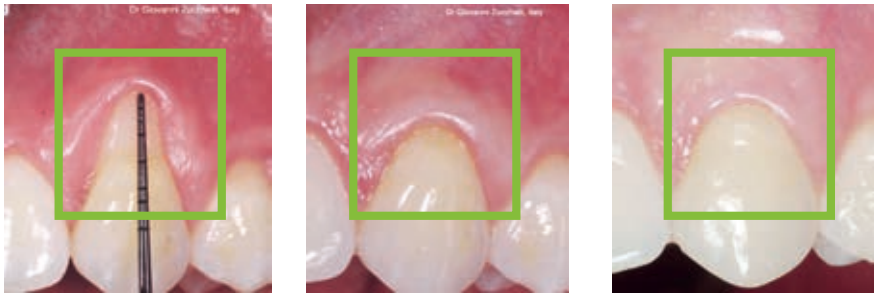
3. A randomized clinical study[4] has shown that the addition of EMD to CAF procedures not only enhances root coverage but also increases the formation of keratinized gingiva, which together may contribute to improved esthetics of the clinical result.

4. A split mouth, randomized clinical trial[5] which compared the treatment of gingival recession defects with either CAF+CTG or CAF + a xenogenic collagen matrix (CAF + CMX) after 6 months and 5 years concludes that CAF + CMX appears to present a viable and long-term alternative to traditional CAF + CTG therapy.

NEXT COURSE:
JUNE 26-27 AND OCTOBER 09-10 IN BOLOGNA, ITALY

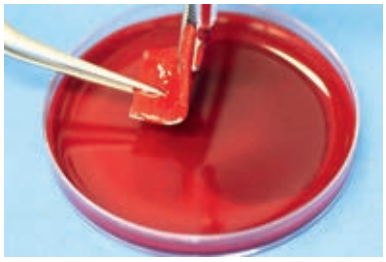
bit.ly/zucchelli-2017

Straumann® Emdogain® is a unique gel containing enamel matrix derivative of porcine origin. The main component is amelogenin, which has demonstrated the ability to stimulate certain cell types involved in the healing process of soft and hard tissues towards a regenerative pattern, thus leading to true periodontal regeneration and accelerated oral wound healing.



Stages of treatment with Straumann® Emdogain® under a Coronally Advanced Flap (CAF): Before treatment (5 mm recession defect) – 8 months after treatment – 7 years after treatment: root is completely covered. With courtesy of Prof. Zucchelli.

Scientific references: straumann.com/stargetref



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We are delighted to sponsor the next courses in June and October 20170 about Reconstructive periodontal plastic surgery around teeth and implants in the esthetic zone with Prof. Giovanni Zucchelli, one of the leading periodontal plastic surgeons. In these courses, you will learn about Prof. Zucchelli's techniques to help you achieve complete root and implant coverage.

bit.ly/zucchelli-2017

Cannot make it to the courses? Watch the recording of Prof. Zucchelli's one-hour webinar free of charge at

www.botissacademy.com

« Prof. Zucchelli's technique for the treatment of single and multiple recession defects affecting adjacent teeth in patients with esthetic demands has been shown to achieve complete root coverage in most patients, irrespective of the number of recessions treated in each intervention. You will have the opportunity to practice this technique on pig jaws, watch two live surgeries and are invited to bring your own cases for an open discussion with the expert. In this course, Prof. Zucchelli will also present his approach for soft tissue dehiscence coverage around single implants which has proven successful in fully correcting severe vertical and horizontal peri-implant soft tissue defects and achieving high patient satisfaction [6,7,8,9]. »

For our own purposes

starget.straumann.com: the place to be in dentistry

STARGET DIGITAL – FOR STRAUMANN'S CUSTOMERS AND PARTNERS AND ALL THOSE WHO WOULD LIKE TO BE

For the past 18 years our magazine STARGET has provided Straumann customers and partners around the world (and those who would like to be) with the latest information about all aspects of dental implant restoration and related fields in five languages. With a varied mix of scientific and clinical articles, conference reports and product information, you will find everything that's new and important in an easy-to-digest form.

STARGET will continue to be available in print format, but in addition now has its own online channel!

starget.straumann.com (English)

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In fond memory: Prof. Samuel Steinemann

SAMUEL STEINEMANN
(5 DECEMBER 1923 – 22 FEBRUARY 2016)

Samuel Steinemann was appointed Director of Research & Development at Institute Straumann in 1962 and served on the company's Board of Directors between 1969 and 1989. He then continued as a scientific advisor to the company in addition to serving as Professor for experimental Physics at Lausanne University.

Samuel Steinemann passed away peacefully on Monday 22 February 2016. We will miss him and his devotion to our company Straumann.

THE KEY TO LONG-TERM SUCCESS: ROUGH STRUCTURES

In the early 1970s, when Straumann began exploring the possibilities for tooth replacement with implants, Sam Steinemann recognized that one of the keys to long-term success lay in the contact region between the implant and the body tissue, in other words in the implant surface. Convinced that only a rough structure could create the conditions for bone to grow onto the surface and thus lead to osseointegration, he was involved in developing dental implants with titanium plasma spray (TPS) coatings.

FROM SLA® TO ROXOLID®

The unquenchable thirst for new knowledge meant that surface technology did not stand still, and in 1990, the first preclinical studies were carried out with a revolutionary sand-blasted, large-grit, acid-etched surface – the "SLA". Driven by scientific curiosity as to how the new macro- and micro–structured osseoconductive SLA® surface would work in humans, Sam Steinemann followed the best traditions of research with a self-experiment in 1994. He had an SLA® implant inserted by Prof. Daniel Buser in Berne – four years before the actual market launch of SLA®. In 2004, Straumann made a quantum leap from surface topography to surface chemistry with SLActive®. Sam Steinemann took the lead in optimizing the surface at the molecular level. He developed and carried out the laboratory experiments that were needed to develop the new technology until it was finally ready for production. It was also his research and genius that led to the creation of Roxolid®, the alloy of titanium zirconium that sets the benchmark for high strength combined with biocompatibility. Roxolid® was the first material specifically designed for use in dental implants.

A TIRELESS RESEARCHER WITH THE PRACTICAL APPROACH OF AN ENGINEER

These are just a few of the breakthrough inventions that have brought smiles and changed the lives of millions of people around the world. We owe him our sincere thanks for the decades of outstanding contribution, both to basic research and to the continuing development of the Straumann® Dental Implant System. Professor Steinemann's achievements go far beyond this (few people know that there is an island named after him). He was a tireless researcher who welcomed people to Straumann with open arms and infectious enthusiasm for new things. He shared his thoughts and genius with countless academics and students, but most importantly his ideas and enthusiasm have been turned into practical reality. And this is what distinguishes him from so many other scientists and makes him an example – even for managers: the practical approach of the engineer – that great ability to make things happen – to get things done.

More than solid – Roxolid®.

Reducing invasiveness.

Differentiate your practice by using Roxolid® Implants. Thanks to their outstanding mechanical and biological properties Roxolid® Implants are designed to offer:

- More treatment options with smaller implants
- Preserve bone and reduce invasive grafting procedures
- Increase patient acceptance with less invasive procedures

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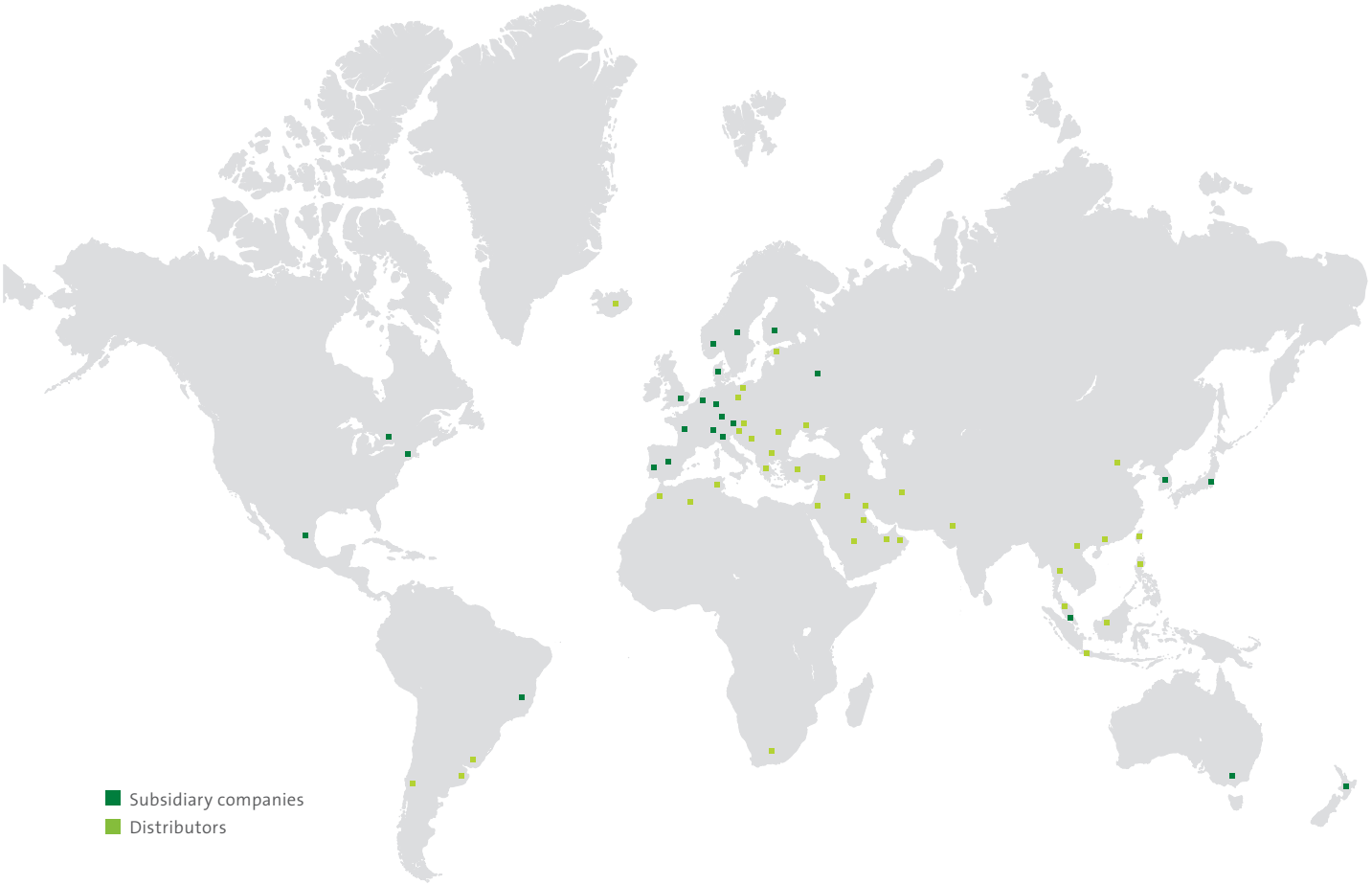

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