

Nobel Biocare NEWS

Information for the Osseointegration Specialist

Issue 1/2011



Strength of Mind and Character



By Richard Laube, CEO

We have come a long way since the 1950s, when a young researcher in Sweden observed that the human body would not only tolerate titanium, but also integrate it into living tissue. Nevertheless, without that young man's curious mind—and admirable tenacity—we'd be nowhere.

The titanium implants used routinely today only exist because of the pioneering work of Professor Per-Ingvar Brånemark. We now have these remarkable objects at our disposal because he was prepared to challenge the conventional wisdom of the times, and demonstrated the determination to systematically document the evidence he needed in order to prevail over well-established opposition.

Since those early days, osseointegrated titanium implants have revolutionized the fields of dental, maxillofacial and orthopedic rehabilitation.

Based on his original findings, innovative bone-anchored restorative solutions have improved the quality of life for millions of people around the world. At Nobel Biocare, we're proud to follow in his footsteps, providing you and your colleagues with evidence-based products that are validated by scientific and clinical research. I trust you'll enjoy the interview with Professor Brånemark that begins here to the left on this page. <

The Titan of Titanium

Professor Per-Ingvar Brånemark grants a rare interview.

Science is what you know. Philosophy is what you don't know. Per-Ingvar Brånemark remains interested in both.

By Frederic Love

At its annual inventor awards ceremony this spring, the European Patent Office (EPO) presented Professor Per-Ingvar Brånemark

with the organization's lifetime achievement award for his discovery and development of osseointegration.

Regarded as the most prestigious prize for European inventors, the award went to Brånemark because, "During the course of his career, he has continued to refine his approach into what has become the gold standard of dental implantation globally—the method of osseointegration."

According to the EPO, "more than eight million people have benefited from Brånemark's landmark methods," since he treated his first osseointegration patient, Gösta Larsson, in 1965.

Serendipity and hard work

I met with Professor Brånemark recently, not far from the University of Gothenburg, Sweden, where he has worked most of his life. When I

asked about the award, he replied simply, "I have received quite a few prizes and awards over the years, but this beats everything else. It represents recognition from colleagues and laymen alike that my method has already helped an enormous number of people. What greater commendation can a scientist hope to receive?"

➔ more on page 2

Innovation on a Firm Foundation

NobelReplace® evolves

By Frederic Love

Suitable for both experienced restorative clinicians and surgical implant users, NobelReplace has evolved into two new versions, both of which retain the key innovations of NobelReplace Tapered.

These features include the tapered implant design, of course, which facilitates high initial stability. They

also include the standardized step-by-step drilling protocol, with its straightforward surgical kit, and the color-coded surgical and prosthetic components, all of which help to reduce placement time by enabling the rapid and safe identification of all components.

NobelReplace Conical Connection (CC) has been designed to

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NobelReplace Platform Shift and Conical Connection.

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From the Editor



Nicolas Weidmann
Senior VP Global Communications

After a decade-long hiatus, we are proud to resume the publication of *Nobel Biocare News*. In this first issue—and every issue that follows—we intend to introduce innovations and disclose trends, as we share the stories and experiences of our readers with the global dental community.

The patient first

From the very beginning, back when Nobel Biocare was known as Nobel-pharma, the company has maintained a determined commitment to develop and support evidence-based treatment modalities. This is still the case today. We promote our products and services for the same reasons you choose them: for the benefit of your patients.

This is not an expression of altruism. Ensuring the best interests of the patient makes our business a viable enterprise and your clinic a secure place to practice dentistry.

The editors want *Nobel Biocare News* to be *your* newsletter as well as ours. If there is an insight you would like to share with your colleagues or a topic you would like us to explore, please *do* get in touch.

We're looking forward to the exchange of ideas! <



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The Titan of Titanium

Exclusive interview with Per-Ingvar Brånemark, continued from the cover

➔ He has come a long way since those early days in the 1950s when, as a young researcher, he was completely absorbed in the study of the anatomy of blood flow.

As part of that work, he attached a titanium-housed optical component to a rabbit's leg, which made it possible to study microcirculation in the bone tissue through specially modified microscopes. The work at hand was completed successfully, but when it came time to remove the metal-framed optics from the bone, Brånemark famously discovered that the bone and the titanium had become virtually inseparable.

"Not long afterwards," Brånemark said, "we changed the direction of our work to investigate the body's ability to tolerate titanium."

Multidisciplinary enterprise

To gain a proper understanding of what he would later call "osseointegration," Brånemark recruited experts from other fields—such as physics, chemistry and biology—to his quest. Physicians, dentists and biologists all joined the effort. Together they developed diligent, methodical techniques for the insertion of implants. At the same time, engineers, physicists and metallurgists studied the metal's surface and how the design of the implant might have an effect on bone healing and growth.

For the best part of two decades, Brånemark faced opposition from the medical establishment in his native Sweden. "Our findings that the body would accept titanium over the long term, and even allow it to integrate in bone, flew in the face of conventional wisdom," he explains. "Theorists' textbook opposition asserted that our implants would trigger initial inflammation and would ultimately be rejected by the body's immune system."

The 1960s were trying times for Brånemark. Funding from Swedish research organizations dried up, yet he persevered. With his physician's certification at stake, he repeatedly demonstrated the accuracy of his claims and the viability of osseointegration. Finally, in the mid-1970s, the Swedish National Board of Health and Welfare approved the Brånemark method.

To reach beyond the world of the university clinic, Brånemark looked for an industrial partner. "I chose Bofors, an antecedent to Nobel Biocare, because they were one of the

few companies who knew how to machine titanium," says the professor. Thus a long-term relationship began.

Over the years, this relationship has had its ups and downs, but both parties have benefited from a long-term devotion to the support and practice of good science. When I asked Brånemark what characterizes good science for him personally, he responded thoughtfully.

"Good science is all about good method. Making observations, collecting facts and data and creating a hypothesis to explain what you've seen—it all starts there. Then you have to deduce the implications of the hypothesis and put the implications to the test. It is very important that all data be considered, not just those that support your ideas. Finally, you have to subject your findings to peer review. At the end of the day, there may be no 'final' truth, but in our field, a valid hypothesis will inevitably lead to practical achievement as it stands up to the scrutiny of other researchers in the field."

As successful as Brånemark has been as a scientist, he has also been successful as an evangelist for the "good news" of osseointegration. When I point out that people listen to him, and ask why, he responds with a smile on his face.

"They listen to me because I know what I'm talking about. Before treating the first patient, I had accumulated more than ten years of experience in the lab, for example. I don't rush to conclusions, and I think people appreciate that."

Followers everywhere

I follow up with the question, "How much of your success can be accounted for by such personal characteristics as perseverance—stubbornness, if you will—and how much by the apostles you recruited around the world?"

"One person alone can't have much impact on the world. I've been privileged to meet and collaborate with some extremely talented people over the years. In addition to all the dental and medical students who have passed my way, I had something like 44 doctoral candidates at the University of Gothenburg over the years, and almost all of them taught me as much as they learned."

Per-Ingvar Brånemark has coined many words and phrases that have become commonly used terms in dentistry. "Fixtures", "anaplastology"



Per-Ingvar Brånemark: "It is very important that all data be considered, not just those that support your ideas."

and "osseointegration" come immediately to mind, of course. When he introduced the concept of the "third dentition," Brånemark got thousands of professionals to start thinking of implant-based solutions not as "false teeth" but "total rehabilitation."

"I chose these words because I found them succinctly descriptive. There's a beauty in language like that. I certainly didn't anticipate how widely they would be accepted, but was pleased, of course, to see how quickly they gained traction in both scientific literature and clinical communication."

When asked to comment on the practicalities of cooperative efforts between science and industry, Brånemark takes the high ground. "We have always needed each other's expertise and have generally enjoyed a symbiotic relationship. In an ideal world, maybe talented scientists would also be gifted production engineers and marketers; and maybe industrialists would be able to see beyond the bottom line; but in the real world—in order to achieve our goals—we each do what we do best and turn to others with complementary skills for help with the rest."

To the question, "Do you think that Nobel Biocare has succeeded in being a good steward of the trust that you long-ago established among dentists?" Brånemark replies: "I think I see a company today that wants to build on its scientific heritage. Together we ushered in a new era, but we all have to remember to respect the molecules. Our method

stands for reconstructive biology, not carpentry." Looking toward the future, he adds, "I'll be very happy if Nobel Biocare keeps the rigorous scientific philosophy of the early years alive in its corporate culture."

Eye on the horizon

While we're on the subject of the future, I ask, "What's next?"

"If you'll allow me to speculate a bit, I believe that we may be on the threshold of a paradigm shift in the professions we practice. Once we realize that biology—especially immunology—lies at the heart of both modern dentistry and medicine, I think we'll start educating dentists and doctors along similar lines at the same institutions. Perhaps the traditional partitions between them will even disappear altogether in the next generation or two."

"As far as my own research is concerned, I see great strides being made in the area of osseoperception, whereby bone-anchored prostheses transmit information that can be intuitively interpreted via the central nervous system. I have patients with osseointegrated limbs, who can actually 'feel' the texture of the rugs on which they're walking today. This aspect of osseoperception is a bountiful field for further research."

Eighty-two years-old and still full of enthusiasm for the work at hand, Professor Per-Ingvar Brånemark remains the best known personality in the world of osseointegration to this day. He has certainly earned the title, "Father of modern clinical implantology." <

Brånemark in Brief

Brånemark, “Unreasonable!”

When Per-Ingvar Brånemark received one of the many honorary doctorates awarded to him by universities around the world, British Professor Richard Johns of the University of Sheffield told the assembled dignitaries that he regarded Professor Brånemark as an “unreasonable man” and went on to quote George Bernard Shaw.

“All progress depends on the unreasonable man. The reasonable man adapts himself to the world: The unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man.”

Great movements begin with one man’s work

In 2009, osseointegration experts from all over the world gathered in Gothenburg, Sweden, to celebrate Professor Brånemark’s 80th birthday. Speaking to the assembled guests, Canadian Professor George Zarb pointed out that “like other scientists working on the frontiers of knowledge, Per-Ingvar used what at the time must have appeared to be uncertain techniques and materials, often with inadequately controlled conditions. He also encountered many obstacles and events that could have invalidated his data; but he persisted ... and luckily for us—and above all, our patients—he triumphed.”

Acknowledging the seminal nature of Brånemark’s applied research, Zarb also said, “He showed [us] that many of the world’s great movements begin with one person’s work, often a single tenacious conviction.” Then he went on to encourage his listeners. “While few have the greatness and opportunity to bend history itself the way Brånemark did, all of us can work to change a small portion of events.”

An appetite for interdisciplinary cuisine

With tongue in cheek, Swedish Professor Tomas Albrektsson says that Professor Brånemark’s interdisciplinary commitment sometimes expressed itself in the early days of his research in unexpected “exchanges.”

“My first memory of my most inspiring teacher ever—Per-Ingvar Brånemark—dates back to the latter parts of the 1960s when some zoologists wanted to finally prove that eels actually migrated to and from the Sargasso Sea. Per-Ingvar invented a sort of titanium button to mark the eels, on the condition that he would be sent a number of fried specimens should the zoologists be able to later prove their point.”

Brånemark apparently inspired loyalty as well as scientific dedication in his team of young researchers. Albrektsson confirms this when he adds: “I stayed with Per-Ingvar until I got my own chair in 1985, but I remain one of ‘his boys’ to this day. With a degree of fondness, he actually still calls us “his Swedes”, not referring to our common nationality but to a popular root vegetable at northern latitudes, the Swedish turnip or rutabaga!”

For further reading

“A System with its Roots in the 1950s,” by Frederic Love in Nobelpharma News, Vol. 1, No. 1, 1987.

“Implanting Hope,” (text and video) on the website of the European Patent Office. www.epo.org/news-issues/european-inventor/finalists/2011/branemark.html

New NobelReplace®

Innovation on a firm foundation, continued from the cover

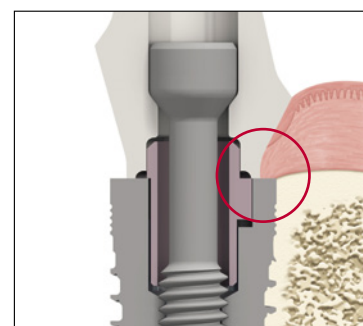
→ increase soft tissue volume, which leads to healthier soft tissue. This new iteration adds an advanced third generation internal conical connection and built-in platform shifting to the well-proven tapered NobelReplace implant body. (To learn more about the design considerations behind the development of the conical connection and a clinician’s first experiences with NobelReplace CC, please turn the page.)

NobelReplace Platform Shift (PS), on the other hand, retains the internal tri-channel connection to which experienced NobelReplace Tapered users are accustomed, while adding the platform-shifting feature now available in NobelReplace CC. Platform shifting promotes expanded tissue volume at the soft tissue interface, thereby creating more natural-looking esthetics, while the proven

tri-channel connection of the NobelReplace PS design provides familiar tactile feedback. With NobelReplace PS, prosthetic components literally drop into place.

Like all other NobelReplace tapered implants, the new versions mimic the shape of a natural tooth root. Designed for high initial stability, they can be placed at good advantage in both extraction sockets and healed sites.

With the latest innovations inherent in the platform shift and conical connection, Nobel Biocare’s versatile implant portfolio has been further expanded to accommodate the personal preferences and treatment needs of every dental professional. The complete assortment includes bone- and tissue-level implants for all indications, bone types and surgical protocols. <



Maximum soft tissue volume

Platform shifting designed for more natural-looking soft tissue.

→ More to explore:

A dedicated NobelReplace CC and PS section is available on the Nobel Biocare website and offers product information, first-user comments, course programs and much more: www.nobelbiocare.com/replaceccps

For Natural-looking Esthetics

NobelReplace® with platform shifting

NobelReplace Platform Shift (PS) allows existing NobelReplace Tapered users to broaden their restorative options without having to abandon the surgical protocol and tri-channel connection with which they are familiar.

By Dr. Egon Euwe

When crestal bone preservation and soft tissue volume are critical, the NobelReplace PS has become my implant of choice.

Let’s look at the following case as a good example of how NobelReplace PS can be used in a premolar restoration. In this case, my patient was a 49-year-old female, who displayed good oral hygiene. She is a non-smoker and has no parafunctional habits. There was actually too much space for the missing tooth.

Figure 1. The patient presented a missing upper left first premolar, a rotated second premolar and an adjacent canine with short clinical crown. Orthodontic correction was not accepted in this case. She also presented a buccal profile characterized by concavity. Mounted casts



Fig. 1. Missing premolar.



Fig 2. Implant placement.



Fig 3. Soft tissue development.



Fig 4. Final restoration.

with a wax-up were used to establish ideal implant positioning.

Figure 2. We placed a NobelReplace PS implant (4.3 x 13 mm). Simultaneously, a connective tissue graft was positioned to increase the soft tissue volume, which was insufficient. In this minimally invasive surgical approach the existing papillae were left intact. We subsequently implemented a four-month, delayed loading protocol to allow for soft tissue graft maturation.

Figure 3. Using a provisional restoration, we developed an esthetic emergence profile and transferred 3D information to the working cast with a customized impression coping.

Figure 4. Here you can see the definitive screw-retained Nobel-Procera implant restoration four months after surgery. The veneering porcelain is directly applied onto an implant abutment with a reduced anatomical contour. In addition, you can see canine crown lengthening and a veneer on the mesial portion of the second premolar.

The ceramics in this case were done by Pasquale Palmieri from Sovico (Milan), Italy. <

→More to explore

Watch the surgery of this case at: www.nobelbiocare.com/replaceccps

Systematic Evolution

Adding a conical connection to a hugely successful implant system.

Dr. Svenja Rogge, a product manager at Nobel Biocare, recently sat down with Steve Hurson, the company's chief scientist, to ask a few questions about the new NobelReplace Conical Connection implants.

Since NobelReplace was first launched in 1997, this tapered implant design has become the most widely used implant system in the world. Nobel Biocare is now making a conical connection available as part of this popular system. What benefits does this feature offer?

Steve Hurson: Experience from the NobelActive implant system demonstrates that even though conical connection implants can be used for all indications, they are best suited for single-tooth and partially edentulous applications. The Nobel Biocare conical connection implants have a tight seal, narrower emergence profile and platform shifting. This type of design has been shown to result in outstanding soft tissue volume and esthetics.

Is a move towards the conical connection something we are likely to see around the world?

Hurson: As we have seen with the success of the NobelActive implant system, there is definitely a global trend toward conical connection implants for the treatment of the partially edentulous patient.

For edentulous applications, the Replace Select Tapered implant placed with the smooth collar in the soft tissue—combined with a Nobel-Procera Implant Bridge or Implant Bar Overdenture—provides a cost-effective treatment that is hard to beat. This treatment plan results in soft tissue adhesion to the collar of the implant, which remains undisturbed during prosthetic manipulation.

Together with Dr. Jack Hahn, one of the pioneers in the field, you developed NobelReplace about 15 years ago. Which scientific research outcomes and clinical experience did you implement when you were designing the original system?

Hurson: Self-tapping parallel-walled implants were the predominant modality at the time of the Replace development. Dr. Hahn identified a need for an implant with a narrower apex, which would achieve higher primary stability in soft bone. The concept was to have an implant design that would have the tapered

shape of a tooth root, for use in difficult-to-treat sites such as type 4 bone, extraction sockets, areas with converging roots and areas with labial undercuts. At the same time, this implant was designed to perform well in hard bone qualities, resulting in a system with outstanding all-around predictability.

NobelReplace has been developed continuously based on the latest scientific research on implants. What important developments have had a lasting influence on the system?

Hurson: Two aspects of the design stand out. The tapered shape of the implant combined with TiUnite (a porous, moderately rough titanium oxide implant surface) provides excellent primary stability and rapid osseointegration, allowing the clinician the flexibility to treatment plan for one- and two-stage healing—and immediate loading. The NobelReplace tri-channel connection is the easiest to use in the industry and was specifically designed to provide long-term trouble-free prosthetic solutions.

NobelReplace is now the most widely used implant system in the world. Why do you think this implant system is the first choice for so many clinicians?



Because of his accomplishments in research and development at Nobel Biocare, Steve Hurson is in great demand internationally as a lecturer on implant design, prosthetics and implant surfaces.

Hurson: It all revolves around predictability and ease of use. The surgical system is state-of-the-art, setting the standard for kit design, color-coding and drill design. The predictability of the straightforward surgical protocol makes this the day-to-day system of choice for experienced surgeons, as well as for teaching new clinicians. Restorative dentists choose the system because the prosthetics are easy-to-use and have a proven track record of providing high-strength, long-term, trouble-free restorations.

The flexibility of the implant system is frequently referred to as one of its major assets. What does that mean exactly from a clinical and prosthetic point of view?

Hurson: There is literally a product for every application ranging from single-tooth restorations to All-on-4 graftless solutions. In demanding esthetic situations, NobelReplace Tapered and now NobelReplace Conical Connection are placed at bone level and can be restored with prefabricated or customized abutments and NobelProcera Crowns. For posterior and edentulous applications, Replace Select and Replace Select TC implants may be placed in a one-stage application, leaving the smooth collar to remain undisturbed in the soft tissue during prosthetic reconstruction.

We see a revival of screw-retained restorations in the industry. Nobel-Procera products range from full-contoured single crowns to full-arch frameworks in titanium and zirconia. These products set the standard for fit, strength and soft tissue health. <

→More to explore:

A dedicated NobelReplace CC and PS section is available on the Nobel Biocare website:

www.nobelbiocare.com/replaceccps

NobelReplace® Conical Connection

Designed for esthetics and ease of use.

NobelReplace Conical Connection (CC) is a new implant concept that merges the well-proven implant body of NobelReplace Tapered with a tight internal conical connection. It is a versatile, easy-to-use implant, which performs well in soft and hard bone alike.

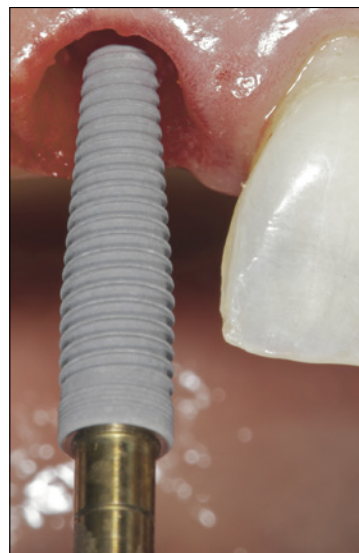
By Professor Alessandro Pozzi

In the following commentary, I would like to share a case of anterior restoration in a 50-year-old woman, who had no parafunctional habits, but two inadequate root canal treatments and severely discolored teeth.



This is what she presented: Vertical fracture of the upper right lateral and central incisors after an incident of trauma. The extraction of both teeth was necessary.

I decided to place two NobelReplace Conical Connection implants (3.5 x 16 mm and 4.3 x 16 mm) immediately after tooth extraction 1 mm below the buccal crest level, in order to create mesial and distal bone peaks for papilla support. We followed an immediate loading protocol including prefabricated abut-

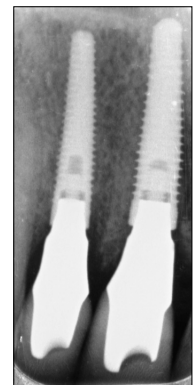


ments and provisional crowns for optimal shape and gingival architecture.



The final abutments were placed four months after surgery. Depicted here, we used two customized NobelProcera Abutments in shaded zirconia.

Directly afterwards, we cemented two IPS e.max® CAD Crowns by NobelProcera onto the NobelProcera



Abutments. The CAD/CAM design of the individualized prosthetic restorations was done by A. Bonaca, and the veneering by P. Paglia and M. Moretti, all three of Rome, Italy. The final result shows excellent soft tissue development and bone formation.

The X-ray of the final restoration was taken four months after surgery. <

IPS e.max® is a registered trade-mark of Ivoclar Vivadent AG.

Strong, Tight Fit and Proven Implant Body

Experience NobelReplace® Conical Connection from the clinical point of view.

Professor Alessandro Pozzi reports from his state-of-the-art private practice in Rome where he has begun to use the new NobelReplace Conical Connection implant in a variety of cases.

By Professor Alessandro Pozzi

To say the least, being introduced to the NobelReplace Conical Connection (CC) was a valuable experience. The NobelReplace CC has been developed to optimize the biomechanical, biological and clinical benefits of a widely used basic design. It demonstrates a new implant concept that merges the biomechanical and prosthetic advantages of a meticulously engineered third-generation internal connection with practical platform shifting, now incorporated into the well-proven implant body of the NobelReplace Tapered. From all the experience I have gathered to date, the NobelReplace CC is a versatile, easy-to-use implant, which performs well in soft and hard bone alike.

In recent years, greater biomechanical demands have been placed on restorative solutions as the use of implants for single-tooth replacement in posterior regions of the mouth has become more widespread and new restorative designs based on axial and tilted implants have been introduced. These restorations require a stronger connection in order to withstand higher torque, lateral loading stress and to minimize forces on the retaining screw and prosthetic components.

In order to improve the biomechanical characteristics of the complete restoration, the internal connection concept was introduced to the world of implant design; but in its first iterations, the internal connection compromised the strength of both the connection and the implant itself.

Finite element analysis reveals that stresses resulting from functional loading are concentrated in the neck area of the implant. Up until now, internal connections have exacerbated this stress due to the weakness of implant walls and deficient load distribution to the bone, resulting from the designs themselves. The wall thickness of the implant in the critical stress zones has to be able to resist material fatigue and breakage under prolonged use while neither sacrific-

Restorative flexibility

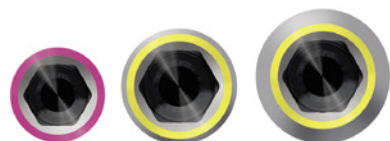
Enhance your treatment flexibility using prefabricated and CAD/CAM individualized NobelProcera restorations to support all temporary and final solutions.*

Maximum soft tissue volume

Built-in platform shifting designed to improve soft tissue for natural-looking esthetics.

Accurate identification

Color-coded components for accurate and fast identification.



* Zirconia abutments with internal conical connection are not indicated for posterior use.

ing “osseointegratable” threads at the neck nor reducing the diameter of the connecting screw.

In the design of the NobelReplace CC implant, the depth of the connection has been optimized to obtain all the biomechanical and clinical benefits associated with an internal connection without substantially weakening the implant by reducing the thickness of its walls. The anti-rotational design of the conical connection minimizes torsion forces and allows the application of high insertion torques on the implant without incurring distortion.

Prosthetics

The conical connection design facilitates the attachment of prosthetic components. From the very first case, comfortable, easy handling becomes the norm, giving the clinician a sense of confidence and security as each connection is made. The design can be characterized as a sliding connection, which allows for contact with the surface of the prosthetic components, improving final placement and minimizing the risk of

damage to the connecting surfaces. In fact, NobelReplace’s conical connection is so precise that proper seating of the prosthetic components does not even require radiographic verification (thus concurrently reducing total radiation exposure for the patient).

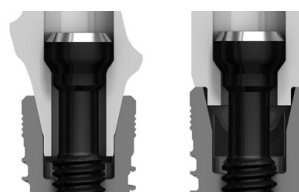
From the taking of the impression to the delivery of the definitive restoration, one of the main causes of poor prosthetic precision is the misplacement of the prosthetic components in the implant connection. NobelReplace CC virtually eliminates this problem. The internal conical connection with hexagonal interlocking offers a tight seal, secure positioning of all the prosthetic components, and tactile feedback. These features help to improve the workflow of both the general practitioner and implant specialist alike. They serve to reduce the likelihood of handling error, speed up procedures and improve patient comfort.

Platform shifting

In addition to the conical connection, NobelReplace CC also adds platform

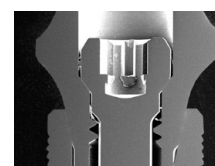
Dual-function prosthetic connection

Internal conical connection for abutments and external platform for implant-level bridge restorations.



Strong sealed connection

Internal conical connection with hexagonal interlocking offers tight seal and high mechanical strength.



SEM image of cross-section of NobelReplace CC RP

shifting to the popular NobelReplace Tapered implant. By equipping the clinically well-proven implant body of the NobelReplace system with platform shifting and a tight prosthetic connection, the clinician has a better chance than ever before to secure healthy soft tissue around the implant in a predictable way.

The tight conical connection and platform shifting both are intended to improve the volume and health of gingival tissue. The tight conical connection is designed to preserve the marginal bone by minimizing micro-movements and eventual micro-leakage, leading to enhanced pink esthetics.

The clinician can now produce a natural-looking restoration accompanied by healthy, soft tissue architecture—and do so with fewer soft tissue grafting procedures. Given today’s high esthetic demands, NobelReplace CC is sure to improve not only patient comfort, but satisfaction as well. The bottom line: quick and predictable implant treatment with long-term functional and esthetic stability.

Restorative flexibility

The new NobelReplace implants offer great restorative flexibility for the treatment of a wide variety of clinical indications, ranging from simple single-tooth restoration in the posterior—via highly challenging anterior tooth replacement—to advanced full-arch restoration, based on both axial and tilted-implant designs.

NobelReplace CC is suitable for use with prefabricated abutments and customized CAD/CAM NobelProcera Abutments. The clinician is provided with a wide range of prosthetic options to make it easier to provide a treatment solution for virtually any restorative challenge. The tapered configuration facilitates the achievement of primary stability in post-extraction sockets, in poor quality bone, as well as in anatomically restricted areas.

The instruments are very simple and can be employed according to the well-proven and easy-to-use NobelReplace Tapered drilling protocol.

Experienced NobelReplace Tapered and NobelActive users will feel familiar with the color-coded surgical and prosthetic kits, which flattens the learning curve. Appropriate for guided surgery, NobelReplace CC is fully compatible with this minimally invasive clinical approach.

The advent of NobelReplace CC is entirely in line with my conviction that modern bone-anchored treatment should be characterized by a minimally invasive surgical approach, high biocompatible prosthetic accuracy and unparalleled patient comfort.

This implant makes it easier to restore the function, the soft tissue framework and the natural look of a healthy mouth. NobelReplace CC is an implant system that meets the demands and requirements of both clinician and patient alike.

The result of high-tech innovation springing from an evidence-based R&D culture, the new NobelReplace CC has become my implant of choice. <

→More to explore:

To read more about the professional features and clinical benefits of NobelReplace CC (as well as those of NobelReplace PS), please visit the Nobel Biocare global website at: www.nobelbiocare.com/replaceccps

NobelActive™ 3.0

Opening a world of possibilities

In situations where space is limited, I've been looking for an implant that provides the high initial stability and strength associated with the original NobelActive implants, which I've used for years. Now, I've found it. Let me walk you through one of the first cases I completed using the new NobelActive 3.0 implant.

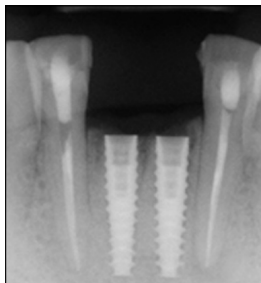
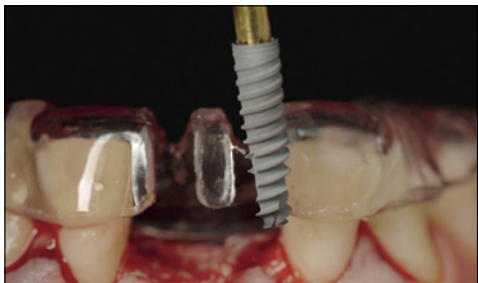
By Dr. Iñaki Gamborena

My patient is a 22-year-old woman who displays the results of good oral hygiene. She does not smoke, nor does she have any parafunctional habits.

Due to extensive root infection and fractured teeth, unfortunately, we needed to extract both of her lower central incisors, leaving a very narrow space for the subsequent two-unit restoration.



A pre-operative X-ray to the left shows the failed endodontic treatment that was attempted prior to the extraction.



We decided to place NobelActive 3.0 x 13 mm implants according to an immediate loading and function protocol that included a connective tissue graft to increase soft tissue volume. A surgical guide was used to ensure optimal implant direction. In the post-operative X-ray just above to the right, you can see the two NobelActive 3.0 implants in place.

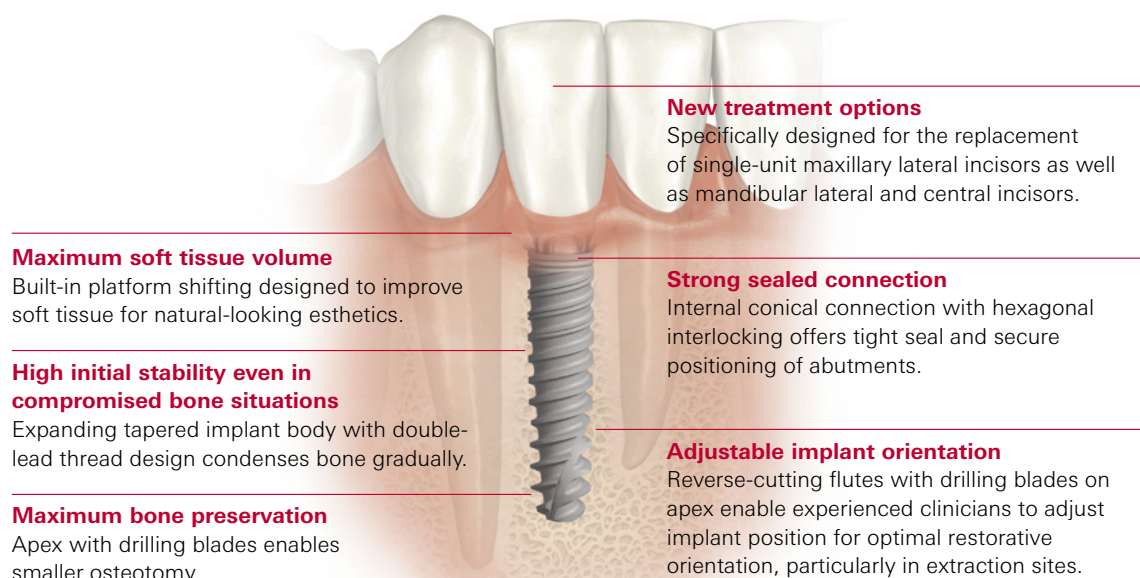
In this image to the right, you can see the preliminary development of an esthetic emergence profile three months after connective tissue graft maturation.



The final restoration was fabricated near my clinic in San Sebastián, Spain, by Iñigo Casares. Here, the two NobelProcera Zirconia Crowns can be seen directly after having been cemented onto NobelProcera Abutments seven months after surgery.



As an experienced user of the full range of NobelActive implants, I trust this new product for treating narrow space cases. <



An Implant for Tight Spaces

NobelActive™ 3.0—safe and secure

By Frederic Love

Narrow diameter implants—usually defined as anything under 3.5 mm—boast remarkable inherent promise. In theory, they make it possible to treat almost all cases involving narrow interdental spaces, especially in situations where there is a minimum amount of hard tissue. In practice, however, they have to be strong enough to survive demanding biomechanical loading and torsion—despite their small dimensions—if they are going to live up to that promise.

To provide a safe and predictable clinical solution to NobelActive users, Nobel Biocare has now developed, and extensively tested, a 3.0 mm NobelActive implant that meets design and material strength criteria of the highest standards. Available immediately through the company's sales channels around the world, the NobelActive 3.0 is sure to be welcomed by osseointegration professionals everywhere.

The NobelActive 3.0 has been specifically designed for the replacement of single-unit maxillary lateral incisors as well as mandibular lateral and central incisors. These very visible single-tooth sites require highly esthetic restorative solutions that can be reliably delivered for the long-term. NobelActive 3.0 fits the bill.

Because there is not much bone to work with in sites like the ones recommended for NobelActive 3.0, maximum bone preservation has been a key priority in engineering aspects of the new design. The apex of

this narrow diameter implant is therefore equipped with integral drilling blades, which allow for a smaller initial osteotomy.

In addition to the drilling blades on the tip of the implant, reverse cutting flutes make it possible for clinicians who are experienced with NobelActive implants to adjust the implant position in order to optimize restorative orientation, which is particularly useful in the extraction sites common in single-tooth anterior restorations.

Dr. Scott MacLean of Halifax, Nova Scotia, finds NobelActive 3.0 to be the perfect complement to the earlier, larger diameter NobelActive implants that he has used for years. "The NobelActive 3.0 is a great implant to use in tight, esthetically demanding areas of the arch. Like the others in the NobelActive family, it

reception to this rule. Thanks to its expanding tapered implant body, with double-helix thread design, NobelActive 3.0 compresses bone gradually, minimizing trauma and providing high initial stability even in compromised bone situations.

Built-in platform shifting is also part of the design. This feature provides a very palpable benefit to the patient. It makes it possible for the clinician to ensure maximum soft tissue volume for natural-looking esthetics. What's more, an internal conical connection with hexagonal interlocking offers a tight seal and secure positioning of the abutment, a must-have characteristic for any first-class, bone-anchored, single-tooth restoration.

According to Dr. Philippe Russe of Reims, France, NobelActive 3.0 has become his implant of choice for

"The NobelActive 3.0 is a great implant to use in tight, esthetically demanding areas of the arch."

—Dr. Scott MacLean

provides excellent results due to its principles of design. The platform shift with conical connection maintains a solid, tight connection that is easy to restore. The thread dimensions and design make it the perfect implant for placement in upper lateral and lower incisors, and it feels very familiar to place and restore."

Respect for bone as a living tissue is key to all research and development at Nobel Biocare. The development of the NobelActive 3.0 is no ex-

cellent esthetics in challenging single-tooth anterior situations. Of NobelActive 3.0 he says, "The extra bony volume around the implant supports longer papillae, improving the esthetic outcome of usually difficult cases. With its well-known excellent initial stability, platform shifting and conical connection, the new NobelActive 3.0 has everything you need in a small diameter implant specially designed for narrow anterior spaces." <

Early or Late Baseline?

Not all study protocols are the same.

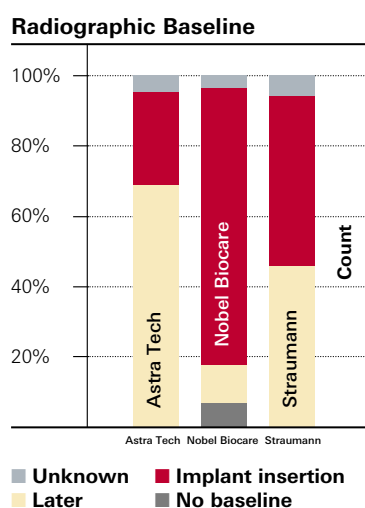
At the 25th Anniversary Meeting of the Academy of Osseointegration, an international group of Nobel Biocare researchers presented the results of a literature review that applied strict inclusion criteria comparing the preferred study protocols of three major implant manufacturers – Astra Tech, Nobel Biocare, and Straumann.

The study also compared the baseline chosen for radiographic evaluation when assessing marginal bone level change.

Covering clinical articles published in peer-reviewed journals over a span of more than 14 years, the review demonstrates noteworthy differences in the types of surgical and loading protocols followed in these articles. While the vast majority of the “study groups” reviewed in the articles on Nobel Biocare implants have followed a one-stage surgical protocol, for instance, almost three out of four featuring Astra Tech implants report on a two-stage protocol

instead. As far as loading protocols are concerned, immediate loading cases were relatively underrepresented in articles written about both Astra Tech and Straumann implants.

In the material under review, significant differences were also seen between the points-in-time at which a radiographic baseline was established for the assessment of marginal bone level change.



Transparent reporting on radiographic data is essential in order to compare radiographic data between studies, as well as to report the total bone level change.

Since a relatively late baseline misses the pronounced initial marginal bone remodeling typical after implant insertion, the choice of different time-points makes it very difficult to compare results between articles.

In summary, the review showed that the study groups in which Nobel Biocare implants had been used reported the highest percentage (84%) of one-stage protocols and the highest percentage (45%) of immediate loading protocols; and that they began measuring marginal bone remodeling most frequently (79%) at implant insertion. <

→ **More to explore**

For more information about “Comparison of Radiographic Baselines and Loading Protocols Utilized in Implant-studies”, please go to the following URL:

www.nobelbiocare.com/iadr-protocols

For further reading, see also:

www.nobelbiocare.com/study-protocols

Recent Findings

NobelActive™ two-year results

At the IADR general session in Barcelona, Spain, the results of a two-year follow-up study of NobelActive implants was presented in July 2010. This multi-center study evaluated bone and soft tissue remodeling around NobelActive implants in immediate function.

The results show stable bone and soft tissue levels after two years in function for the NobelActive implant. The results also demonstrate that the implant can be used under the demanding treatment conditions associated with immediate loading.

→ www.nobelbiocare.com/nobelactive-abstract

TiUnite® 7-year, immediate loading

An article in “Clinical Implant Dentistry and Related Research” documents the 7-year outcome of immediately loaded implants with the TiUnite surface. It can be found as an ePub online.

“Implants with an Oxidized Surface Placed Predominately in Soft Bone Quality and Subjected to Immediate Occlusal Loading: Results from a 7-Year Clinical Follow-Up,” demonstrates that the immediate loading protocol used in the underlying study is a successful treatment alternative even in regions exhibiting soft bone conditions. TiUnite enabled this approach and has proven very successful in the long-term, showing stable bone levels and high survival rates.

→ www.nobelbiocare.com/tiunite-abstract

Zirconia-based ceramic copings

A recent study published in The Journal of Prosthetic Dentistry has demonstrated that computer-aided technology can produce zirconium oxide-based ceramic copings with a clinically acceptable marginal fit.

Of the four systems tested in the study, the highest marginal accuracy was achieved with the Procera system.

The authors were motivated by the fact that it had proven virtually impossible to compare results from studies on the marginal accuracy of zirconium oxide-based restorations, because a variety of different assessment methods had previously been used for each of the different computer-assisted systems.

→ www.nobelbiocare.com/zirconia-abstract

For further reading

If you would like to read more detailed information relating to NobelActive 3.0—including its many features and clinical benefits—a product-specific website is available at the following address:

→ www.nobelbiocare.com/active3

Cold-worked C.P. Titanium

Brånemark called it “Titanium held to a higher standard!”

Since his discovery of osseointegration, Professor P.I. Brånemark has prescribed commercially pure (c.p.) titanium for use in dental implant restorations.

The strongest standard grade of c.p. titanium is ASTM Grade 4 with a 0.2% yield strength of 480 MPa. Nobel Biocare surpassed this standard by developing a proprietary cold-working process for Grade 4 Titanium to achieve even higher yield strength.

From market introduction, following extensive material- and pre-clinical testing, Nobel Biocare’s cold-worked c.p. titanium and patented TiUnite surface have been documented as exceptionally strong and clinically proven to enhance osseointegration. Nobel Biocare has used c.p. titanium for over 20 years and this specially processed version has been used in all Nobel Biocare implants for over 10 years.

Strength in all diameters

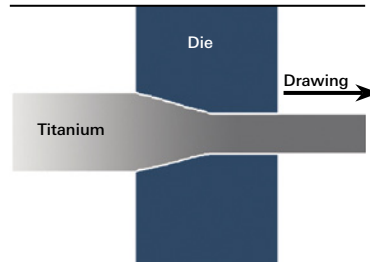
Nobel Biocare’s cold-worked c.p. titanium is especially suited for the unique NobelActive implant design, providing the enhanced material strength needed for the required fatigue strength as well as the thin-cutting threads.

The strength of Nobel Biocare’s c.p. titanium also benefits the performance of smaller diameter implants. Nobel Biocare has over 10 years of experience in smaller diameter implants beginning with the year 2000 launch of the Ø3.3 Brånemark System MK IV until the current release of NobelActive 3.0.

Smaller diameter implants offer less invasive dental implant solutions for patients with narrow bone ridges, and limited space between teeth. A smaller diameter can also minimize the need for guided bone regeneration procedures. The Ø3.0, Ø3.5 and Ø4.3 NobelActive implants are produced from the specially processed c.p. titanium MTA 010 material,

which has nearly the same yield strength as the titanium alloy Ti-6Al-4V used in Nobel Biocare titanium abutments and all abutment screws. NobelActive Ø5.0 implants are produced from the MTA 009 material. <

Cold-working process for c.p. titanium



“Cold-working” is a strengthening process. At a specific temperature (near room temperature) and drawing rate, titanium is deformed in a die, resulting in material strain hardening.

→ **For one very interesting application of this material, see the articles about NobelActive 3.0 on the facing page.**

Diagnostics, Treatment Planning and Guided Surgery



Always on the go at his clinic in Zürich, Dr. Roland Glauser uses NobelClinician Software as a diagnostics and treatment planning aid on both stationary and laptop computers.

The first patient was treated using guided surgery more than a decade ago, in 2000. Subsequently, the concept was cleared by the FDA and launched by Nobel Biocare in the spring of 2005. No other company has such extensive experience with guided surgery and 3D diagnostics.

Dr. Pascal Kunz, who is responsible for guided surgery solutions at Nobel Biocare, posed some questions this month to Dr. Roland Glauser on the current state of guided surgery.

An accomplished dentist as well as a respected academic, Dr. Glauser lectures internationally and runs a successful private clinic in Zürich, Switzerland. He is also an expert in emerging technologies that help improve patient care, such as NobelGuide and NobelClinician.

You were one of the first to work with the NobelGuide system. How has it affected the way you have diagnosed and treated patients over the last eight years?

Dr. Roland Glauser: First and foremost using NobelGuide has increased treatment predictability and given me access to more advanced treat-

ment options—especially in regards to immediate function and the pre-fabrication of provisionals. The diagnostics and planning software was always quite straightforward to use. The new NobelClinician Software goes a step further, however, by offering even more options, particularly in general diagnostics.

With this system, I can reference significant visual information in a virtual 3D world to test for—and ultimately identify—locations for the best possible implant placement from both a prosthetic and surgical point of view. Rather than being

and also the stress level on the day of surgery. With a well-planned treatment already mapped out and implants installed at ideal prosthetic positions, the restorative process becomes a smooth, step-by-step procedure.

It should also be noted that communicating the treatment plan to colleagues—or the patient himself—is made much easier when a digital diagnostics and planning tool such as NobelClinician Software is used.

Have you seen a change in the type of questions posed by prospective implant patients over the years?

Glauser: Certainly, today's implant patient is better informed than his or her counterpart ten years ago. A variety of media—not least of all the Internet—are full of information and commentary on dentistry in general and implants in particular. Patients simply know more today about the dental implant option—and many of the specific procedures, as well.

I find that questions are less general and more focused on the types of materials, procedures and prognoses today. What's more, the sheer volume of questions asked is greater than it used to be.

More than ever before, correct and compelling pre-treatment informa-

tion that meets the patient's needs is an essential aspect of the practice of dentistry.

In which situations do you choose guided surgery today?

Glauser: In quite a few different situations, actually: For example, whenever a grafting case has to be transferred figuratively into a non-grafting case. In medically compromised patients—such as hemophiliacs—or whenever minimal invasiveness and reduced working times are preferable, so is guided surgery. Naturally, I also often use guided surgery when meager hard tissue and a demanding restorative set-up dictate precise implant positioning. Finally, whenever a provisional restoration has to be produced in advance of the surgery—in cases calling for immediate function, for instance—there is no better solution than guided surgery.

Over the last few years, more and more computerized systems for 3D imaging, diagnostics, treatment planning and even guided surgery have been introduced to the market, complicating purchasing decisions for clinicians. If someone were to ask you about introducing these technologies in their clinic or practice, how would you suggest they get started?

Glauser: I think they should start with a wish list that includes all the things they would like such a system

to be able to do in their practice. Some people may only want help with diagnostics, while others would prefer a full range of diagnostic, treatment planning and guided surgery options in the same package.

Nobel Biocare has launched a new version of the company's diagnostics and treatment planning software, called NobelClinician. As a user of the previous system, what's in it for you?

Glauser: For one thing, I am now able to review all the CT scans within one software environment. For another, the new software certainly makes it easier to share data and to communicate one's intentions with colleagues and lab technicians. That's very important. I'm happy to see that the new package works equally well on the Mac as it does on a Windows PC and, as one might expect from Nobel Biocare, the user-friendly interface is highly intuitive in both design and execution.

For entry-level doctors, there's even a built-in treatment assistant to guide the novice through the complete workflow, tracking all actions as they are carried out, and providing task-specific information at each step of the process. <

→ More to explore:
www.nobelbiocare.com/nobelclinician
www.nobelbiocare.com/nobelguide

Q&A

Questions and Answers

forced to compromise between restorative requirements and surgical imperatives, I like to think that we can optimize instead.

From the patient's point of view, comfort has been improved, as a reduction of chair-side time and less invasive procedures have become possible. The concept allows one to obtain a complete picture before surgery. This reduces potential surprises



Dr. Roland Glauser says, "I am now able to review all the CT scans within one software environment [and] the new software certainly makes it easier to share data and to communicate one's intentions with colleagues and lab technicians."

Rely on the Evidence

In dental practice—as in other areas of day-to-day life—not all evidence merits the same respect. Evidence with the fewest inherent biases and highest direct relevance generally deserves the greatest consideration.

By Dr. Alexandra Rieben

According to the widely discussed and generally accepted concept of evidence-based medicine (EBM), five steps are usually followed. Step 1 is to translate a clinical uncertainty into an answerable question. Step 2 consists of the systematic retrieval of the best evidence available. In step 3, this evidence is critically appraised for validity (closeness to the truth) and applicability (usefulness in clinical practice) and then applied, in step 4, in practice. Finally, in the last step, one evaluates the clinical results.

The strongest evidence for any given therapeutic intervention is provided by the systematic review of randomized, (triple) blind, placebo-controlled trials. When they incorporate a high percentage of follow-up involving a homogeneous patient population and medical condition, they become even more reliable. This sort of evidence stands at the top of the hierarchical pyramid of evidence.

In contrast, case reports and expert opinion have little value as proof of efficacy because of the biases inherent in observation and the reporting of

S&E

Safety and Efficacy

cases, difficulties in ascertaining who is an experienced reporter, and so on. Laboratory research, including valuable animal studies designed to learn more about the microscopic structure

of living tissues, may provide impetus for new areas of research, but rarely—according to the principles of EBM—provide immediate guidance on how to treat patients on a day-to-day basis. Therefore, in vitro and animal studies are normally not included in the pyramid of evidence.

The most common definition of EBM is taken from Dr. David Sackett *et al*, a pioneer in evidence-based medicine. (See “Evidence based medicine: What it is and what it isn’t. *Br Med J*. 1996;312:71-72) It is “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research.”

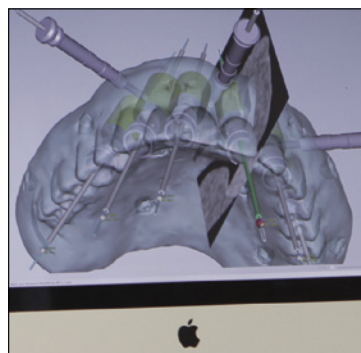
However, the most reliable types, as outlined above, may not always be available for every field of clinical inquiry. A sham operation may not fall within the scope of good ethics, for example, or blinding may not always be feasible in every field of research. Sackett *et al* pointed out that “Evidence-based medicine is not restricted to randomized trials and meta-analyses. It involves tracking down the best external evidence with which to answer our clinical questions.” The TiUnite literature listed below falls into the upper range of the reliable types of evidence. <

→ More to explore:

“Recommended reading for TiUnite®” – Fifteen key publications supporting the safety and efficacy of TiUnite” is available for downloading at: www.nobelbiocare.com/tiunite-support

The most to least reliable types of evidence according to Sackett and co-workers:

- 1A = Systematic Review of Randomized Controlled Trials (RCTs)
- 1B = RCTs with Narrow Confidence Interval
- 1C = All or None Case Series
- 2A = Systematic Review Cohort Studies
- 2B = Cohort Study/Low Quality RCT
- 2C = Outcomes Research
- 3A = Systematic Review of Case-Controlled Studies
- 3B = Case-Controlled Study
- 4 = Case Series, Poor Cohort Case Controlled
- 5 = Expert Opinion



NobelClinician is Nobel Biocare’s next generation software for digital diagnostics and treatment planning.

Fully compatible with the NobelGuide workflow and tooling for guided surgery, it replaces the origi-

NobelClinician™ Now Available For Mac OSX and Windows

nal NobelGuide Software but also offers additional functionality that reaches beyond the scope of guided surgery.

Any DICOM (digital imaging and communications in medicine) file produced by a cone beam (CB)CT scanner can now be reviewed and analyzed using new workspaces and new tools that expedite patient diagnostics and team collaboration.

NobelClinician Software has been devised for the work at hand. An interactive digital assistant keeps track of planning tasks and offers additional guidance throughout the

workflow. Via built-in patient management functionality and the NobelConnect module, you can collaborate efficiently and securely online with select treatment partners.

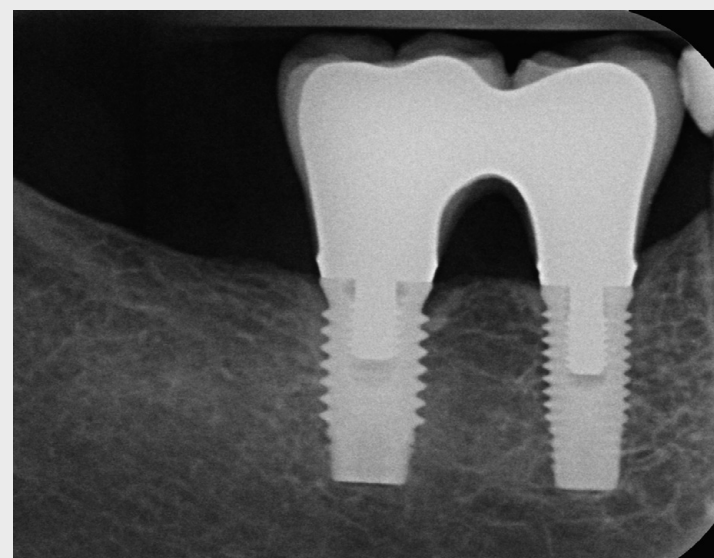
NobelClinician Software is the first diagnostics and treatment planning software from Nobel Biocare to run with the same look and feel on Windows and Mac OS X, so now you can work with the operating system of your choice. Existing users currently paying the annual maintenance fee qualify for a free upgrade. Please contact your local Nobel Biocare office for details of this offer. <

In Brief

TiUnite® – 11 Years On

Well over eleven years ago, the first patient was treated using Nobel Biocare implants with the TiUnite surface. Now seventy-nine years old, this Swedish-Swiss dual citizen recently visited her dentist, Dr. Roland Glauser, at his offices in Zürich.

At that annual check-up, Dr. Glauser took the following X-ray.



Two Brånemark System Mk IV implants with the TiUnite surface were placed in positions 45 and 46 in March 2000. This recently taken X-ray shows both implants restored with screw-retained, connected porcelain-fused-to-metal crowns and reveals excellent marginal bone levels.

Her Brånemark System treatment had begun much earlier. Back in the early 1990s, the patient had received Brånemark System implants with the traditional machined surface in the upper jaw to replace lost molars on both sides. Then, in March 2000, she became the first patient to receive Brånemark System Mk IV implants with Nobel Biocare’s new TiUnite surface. Two were placed in the lower right jaw to replace a lost premolar and the adjacent molar.

The long-term results speak for themselves.



This lateral view of the two crowns—which have now been in place for more than eleven years—indicates that the surrounding soft tissues are both robust and healthy.

→ More to explore:

www.nobelbiocare.com/tiunite

www.nobelbiocare.com/tiunite-abstract

Screw- or Cement-Retained Restorations

Good choices abound in the era of modern CAD/CAM technology.

Providing the patient with a reliable and lasting restoration is essential in today's highly competitive dental market.

By Hans Geiselhöringer and Dr. Stefan Holst

The long-term clinical success of an implant-supported restoration depends on a multitude of biological and component-/material-related factors. Choices concerning the type of connection and the retaining system between an implant and the prosthetic restoration are two key aspects of the clinical decision-making process.

While some clinicians favor the use of cement-retained restorations, others consider screw-retained prostheses to be the best choice. While this issue is being debated in clinics, scientific studies have yet to provide conclusive data demonstrating superior outcomes for one technique over the other. Therefore, the clinician must evaluate and be aware of the advantages and potential disadvantages of each solution and their specific implications in any given clinical situation.

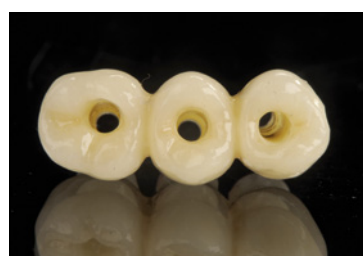
Pros and cons

Aside from personal preferences or scientific data, the primary factor in the decision-making process is the position and angulation of the implant in relation to the anticipated final restoration. If the screw access is favorable (e.g. in the central fossae of a bicuspid/molar or on the palatal side of an anterior crown), a screw-retained restoration may be fabricated.

Porcelain is directly fired onto the abutment, and the abutment-crown complex is screwed onto the implant. This type of restoration offers efficient and fast clinical handling protocols and easy maintenance. Retrievability and the absence of cement between the abutment and the crown are two of the greatest advantages vis-à-vis cement-retained solutions.

A disadvantage often discussed is the presence of an occlusal access channel for the screw that interferes with the morphological integrity of the occlusal table. While laboratory trials have shown a potential detrimental effect upon the application of load, clinical long-term follow-up

studies do not support such assertions, reporting comparable outcomes instead. Furthermore, arguments of increased rates of screw loosening and fractures in screw-retained abutments should be classified according to their publication date and the type of components used at that time (e.g. formerly used gold screws instead of currently-used titanium retaining screws; cast instead of industrially manufactured prosthetic components).



High quality standards and precision ensure longevity for both screw- (left) and cement-retained (right) NobelProcera custom solutions.

Cement-retained restorations on custom titanium or ceramic abutments, on the other hand, allow for the compensation of misaligned implants and can be treated like natural teeth. The non-disrupted morphology of the occlusal table may be considered a favorable aspect of this choice, eliminating the requirement for subsequent closure with composite resin and potential impairment of the esthetic outcome that occurs when metal-based frameworks are used.

Zirconia-based frameworks, however, eliminate this disadvantage. If white or shaded substructures are used, then easy, fast and esthetically pleasing closure of the screw access channel can be achieved with conventional composite resin materials.

The main disadvantages of cement-retained restorations are the potential risk for cement trapping in the peri-implant tissues and retriev-

ability difficulties when peri-implant tissue assessment and/or the maintenance of prosthetic components are required. Despite the fact that some studies suggest the use of temporary luting agents to make retrievability practicable, such protocols should be carried out with great care when implementing all-ceramic restorations.

Although widely recognized for years, the detrimental effect that cement remnants can have on peri-implant tissue health and integrity has



only recently become the focal point of professional presentations and scientific articles. To reduce the risk for cement trapping, it is essential to position the height of the crown-abutment interface at, or slightly below, the gingival margin to allow for easy access and complete removal of luting materials. This prerequisite means that a customized implant abutment must be used in most cases.

Changing the odds via CAD/CAM

The choice between screw- and cement-retained prostheses does not only need to be made for single-unit implant restorations. It is equally important for multiple splinted implants.

Whenever an implant-retained bridge framework (i.e. fixed dental prosthesis, or "FDP") is connected to implants, the clinical longevity and need for maintenance repair depends to a great extent on the pre-

cision of the manufactured components. Non-passively fitting implant-supported superstructures are still considered to be a potential cause for the high incidence of technical complications associated with these restorations.

In cement-retained implant superstructures, the cement layer can compensate for dimensional discrepancies between the abutment and the restoration to some extent, working as a filling medium to more uniformly transfer loads to the implant-prosthesis-bone complex.

This type of compensation for misfit is not possible in screw-retained superstructures, where even small dimensional discrepancies result in localized loads and stress concentrations that are transferred to the implant-abutment complex/components. Scientific evidence shows that with conventional fabrication methods, three-dimensional distortions of the finished restorations inevitably occur, thus precluding passive fit.

The computer-aided design-/computer-aided manufacturing (CAD/CAM) of restorations has been shown, however, to result in significantly greater accuracy when compared to traditional fabrication techniques such as casting.

Due to the above-mentioned quality-of-fit shortcomings of cast components, cement-retained restorations became the predominant solution for multiple-implant restorations in the past. With the availability of CAD/CAM systems and high quality precision products, however, a trend towards an increased use of screw-retained solutions is evident today, due to fast and simple clinical protocols and other attendant advantages.

In summary, it can be concluded that the decision to cement- or screw-retain an implant-supported crown or FDP depends on the personal preference of the clinician and the patient-specific clinical situation. The availability of CAD/CAM manufacturing technology and biocompatible materials, such as titanium and zirconia offer a multitude of patient-specific treatment options and alternatives, which make it feasible to routinely provide patients with the best possible quality solutions. <

→ More to explore:
www.nobelbiocare.com/nobelprocera

Upcoming Events

Visit Nobel Biocare at events around the world. They provide a great opportunity for observing the latest innovations and scientific research, but also for meeting and interacting with the dental community and industry experts. Nobel Biocare participates in a number of key industry events and symposia across the globe each year and hosts its own leading scientific congresses to better gauge and meet the needs of customers and their patients.

- 2011**
- AAID 60th Annual Meeting**
19–22 October
Las Vegas, Nevada, USA
American Academy of Implant Dentistry (AAID)
- Competence in Esthetics 2011**
11–12 November
Vienna, Austria
- AAP Annual Meeting**
12–15 November
Miami Beach, Florida, USA
American Academy of Periodontology (AAP)
- Swedental**
17–19 November
Stockholm, Sweden
- DGI Congress**
24–26 November
Dresden, Germany
Deutsche Gesellschaft für Implantologie (DGI)
- Greater New York Dental Meeting**
25–30 November
New York, USA
- AAOMS Dental Implant Conference**
2–4 December
Chicago, Illinois, USA
American Association of Oral and Maxillofacial Surgeons (AAOMS)
- 2012**
- Yankee Dental Congress**
25–29 January
Boston, Massachusetts, USA
- CIOSP**
28–31 January
São Paulo, Brazil
Congresso Internacional de Odontologia de São Paulo (CIOSP)
- ICOI Winter Symposium**
16–18 February
San Diego, California, USA
International Congress of Oral Implantologists
- CDS Midwinter Meeting**
23–25 February
Chicago, Illinois, USA
Chicago Dental Society (CDS)
- LMT Lab Day Chicago**
24–25 February
Chicago, Illinois, USA
Lab Management Today (LMT)
- AO Annual Meeting**
1–3 March
Phoenix, Arizona, USA
Academy of Osseointegration (AO)
- Nobel Biocare Symposium 2012**
21–23 March
Gothenburg, Sweden

→ To find out more, visit
www.nobelbiocare.com/events

Implant Cementation, Step by Step

Guidance and advice to help you acquire confident technique.

Cementing crowns and fixed partial dentures (bridges) onto implants has become increasingly popular, but it is not without issue.

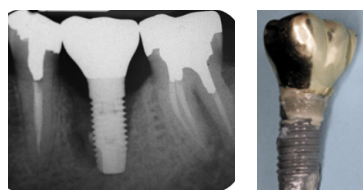
By Drs. Chandur Wadhvani and Alfonso Piñeyro

One cause of local tissue inflammation associated with dental implants that has recently come to light is dental cement. Cements have been directly linked with peri-implant diseases and have been blamed for bone loss and implant failure. One aspect of the disease process that is especially concerning is the time between restoring the implant and the disease process—on average three years pass before dentists discover a problem, with a range of four months to beyond nine years!

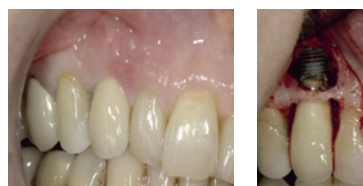
T&T

Tips and Techniques

Dentists should be made aware of the differences between implants and teeth. Because their peri-implant biology is not the same, the appropriate cementation techniques, suitable cement selections, and even the procedures for the clean-up of excess cement are different. This article will briefly highlight these issues and offer solutions to overcome the attendant problems.



Radiograph and photograph of failed implant with cement remnants.



This patient presented five years after the crown was cemented. When a flap was raised the bone loss became apparent, as did the cement around the implant!

Peri-implant biology

Many clinicians consider implants to be similar to teeth, but they differ in many important ways. A weak adhesion exists between soft tissue connective tissues and implant surfaces, for example, whereas teeth have a more robustly developed attachment system. The clinician should be aware of the fact that the weaker soft tissue adhesion seen with implants is more susceptible to complications caused by excess cement and the hydrostatic force of cement being pushed into the tissues during crown placement.

Cementation techniques

Clinicians often do not understand that only a very limited amount of cement is needed to fix a restoration to an implant abutment. A recent survey of over 400 dentists showed that many dentists placed in excess of 20 times more cement into the crown than was required. This overload of cement means that 95% are extruded out at the restorative margin, which is frequently found below the gum, making cement removal virtually impossible.



Actual photo of how some dentists loaded crowns with cement as if they were to be placed on implants in their offices!

Solution

Limit the amount of cement that is placed in the crown. As teachers, we train clinicians to understand that too much is undesirable. We often equate the amount needed to everyday, well-known subjects, for example: "The space provided for cement on the inside of the crown during the making of the crown is the same thickness as a layer of nail polish." This layer is often about 50 microns thick, which is about the thickness of a human hair!

A technique has been developed using a spacer and some fast-setting dental impression material to make a chair-side copy abutment (CCA) that can be used to coat the inside of the crown with close to the 50 microns needed.

The crown is painted internally with a water-soluble lubricant such as KY jelly (Vaseline can be used but it must be adequately cleaned later). This allows PTFE (plumbers tape, which is 50 microns thick!) to be adapted to the inside of the crown using a dry brush. Complete the adaptation by gently pushing the abutment into the crown and then carefully removing it. Inspect the inside of the crown to see if the PTFE is well formed.



The inside of the crown has a layer of PTFE tape adapted to it. (KY jelly was used to help the PTFE stick to the inside)



Further adapt the PTFE against the walls of the crown by gently placing the abutment. When complete, remove the abutment and make sure that the tape is even.

To make the CCA: Using a fast-setting impression or bite registration (Blu-Mousse) material, fill the inside of the crown and continue to overfill until a "handle" is produced. (Hint: Use a fine-tip nozzle.)



Making the CCA. The crown with the PTFE lining being filled with Blu-mousse. A handle is being formed.

Remove the CCA, then remove the PTFE and clean out the inside of the crown (important!) to remove the KY jelly or Vaseline.



Removing the CCA and the PTFE.

Now you have a chair-side copy abutment. The CCA is 50 microns smaller than the inside of the crown! Inspect it, compare it to the actual abutment, and make sure you know the orientation.



Check for defects and orientation.

The CCA is now ready for use. Place the abutment in the patient's mouth, confirm that it sits, and torque the screw to the appropriate Ncm value. The crown is now ready to be cemented.

Load the crown with any amount of cement you wish—the CCA will subsequently be pushed into the crown, and the excess cement will be extruded chair-side and easily removed. (This is done outside of the mouth.)

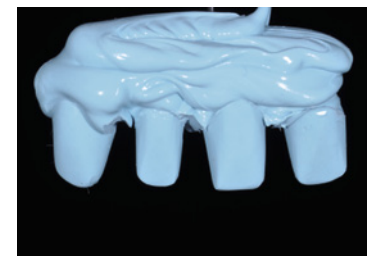


The CCA is seated into the crown, allowing excess to be removed extra-orally. (Hint: When you first try this, use a cement with an extended setting time.)

Inspect the inside of the crown for an even cement layer. If you find any "bare" areas, just add a little extra. Then seat the crown in the mouth.

Many advantages of the CCA

A fast, inexpensive, simple technique, this approach limits excess cement to an absolute minimum, and makes cleanup quicker and easier. The CCA can be used for custom, stock and even multiple abutments!



Multiple CCA abutments can be easily made, and used to remove excess cement.

The CCA is an improvement over using the actual abutment, or laboratory abutments, which do not provide quite enough cement space to assure suitable amounts of cement for problem-free crown retention. The CCA produces the ideal amount! <

Special thanks to Drs. Ken Akimoto and Franco Audia for providing the cases and the associated photographs in this article.

→ More to explore:

"The positive relationship between excess cement and peri-implant disease," by T. Wilson, in J Periodontol, 2009; 80: 1388–92
"Technique for controlling the cement for an implant crown," by C. Wadhvani and A. Pineyro, in J Prosthet Dent, 2009; 102: 57–8.

And keep your eyes open for a soon-to-be-published article on this topic by Wadhvani, Pineyro et al in an upcoming issue of IJOMI.

Customized Implant Abutments

To make your decision easier, consider the many clinical and laboratory advantages they offer.

For the benefit of the patient, the clinic and the laboratory, collaboration across professional boundaries is essential.

By Hans Geiselhöringer

When restoring dental implants, the clinician is met with an ever-expanding variety of treatment options. As a result, the task of selecting the most appropriate components is often delegated to the dental technician. This course of action has become common despite the demonstrated fact that collaborative discussion between the clinician and dental technician is key to providing the best possible service for the patient. The objective of the following overview is to emphasize not only the need for cooperation and joint decision-making within the treatment team, but also to accentuate the clinical and laboratory advantages of routinely using custom-made implant abutments in everyday practice.

The clinical challenge: Long-term tissue stability

In addition to establishing a satisfactory implant site and ensuring a congruent blending of the restoration with the neighboring dentition, the greatest challenge facing the restorative team is to ensure long-term stability of the peri-implant tissue architecture. Destructive processes resulting from poor quality implant superstructures increase the risk for inflammation and the continuous loss of supporting hard and soft tissues. Consequently, the selection of suitable materials and an optimal design of the definitive restoration are paramount for success.

When designing an abutment, the position of the implant in relation to the final crown contour, the thickness and biotype of the surrounding tissue, as well as the location within the arch must be taken into account. For cement-retained superstructures, it has been established that the location of the abutment-crown margin should always be located at, or slightly below, the gingival crest to allow for the complete removal of

Customized CAD/CAM Abutments Clinical Advantages

- Long-term clinical stability through biocompatible and homogenous materials
- Formation of tight soft tissue contact
- Eliminates the risk of contact corrosion between dissimilar metals and alloys
- Maximizes long-term esthetic results through application of shaded zirconia

cement. If remnants of the cementation medium remain, potential risk of peri-implant inflammation and adverse tissue reactions increase significantly. (See cementation article on page 11.)

The advantages of titanium and zirconia materials for clinical use

Research indicates that the type of material used in implant-retained restorations affects both the amount and the quality of the surrounding tissues. While cast gold abutments are still used extensively today, scientific data strongly indicate that the reaction of cells towards materials with a corrosive potential—such as cast alloy components or veneering porcelain—is inferior to the reaction of living cells towards homogenous materials. Among the homogenous materials available for implant abutments and superstructures, titanium and zirconia are the most auspicious. Titanium abutments provide a biocompatible and clinically well-proven

treatment option in areas where high strength is required or only limited space is available—and is far superior to cast alloys. Extensive research and development in ceramic materials have resulted in the availability of non-silica-based ceramics in dentistry that demonstrate excellent characteristics in terms of biocompatibility, esthetics, and long-term clinical function. Today, zirconia (ZrO_2) is considered by many clinicians to be the material of choice for abutments. In addition to material properties that allow its application in any area of the mouth, the greatest advantage of ZrO_2 is its unrivalled support of adjacent tissue. Zirconia observably enhances tight adherence of peri-implant tissues while minimizing bacterial and plaque adhe-

sion at the same time. The key benefit of homogeneous materials such as titanium and zirconia is that their use eliminates material incompatibilities and corrosive phenomena arising from dissimilar metal alloys and interfaces between cast and machined components.

The choice: stock or custom implant abutments?

The restorative team may choose from prefabricated or customized abutments for both implant-retained single- or multi-unit restorations. As indicated previously, the primary objective must always be proper support of the surrounding tissues, optimal morphology to support the restoration without impairing hygiene maintenance, and anatomic design to allow for ideal support of the veneering ceramics in screw-retained abutments. While these requirements can practically be achieved with either conventional laboratory processes and stock components, or computer-aided design/computer-aided manufacturing (CAD/CAM) technology and custom products, recent scientific evidence strongly suggests that the application of the latter is preferable. This is because industrial manufacturing offers numerous benefits compared to manual framework fabrication. Time-consuming wax or resin setups becomes redundant

Customized CAD/CAM Abutments Laboratory Advantages

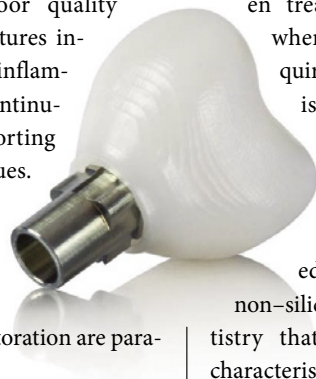
- Free-virtual design options
- Screw- or cement-retained restorations
- Optimal support of peri-implant soft tissue through individual abutment profile
- Round contours, no sharp edges
- Facilitates ideal positioning of cement line
- Independent from implant system and connection type

when the newest generation of CAD software is used to virtually design any desired abutment shape. At the same time, industrialized fabrication guarantees standardized product quality and precision of fit, while reducing cost-intensive manual labor at the same time.

Using prefabricated abutments, on the other hand, has numerous disadvantages. These range from time-consuming and unpredictable customizing processes in the laboratory to the need for intraoral adjustments and suboptimal support of peri-implant tissues. The greatest uncertainty is related to the uncontrolled manipulation of oxide ceramic components. Post-sintering manipulation significantly increases the risk

of detrimental micro-cracks that can increase the risk for catastrophic failure under clinical function. What's more, the application of veneering ceramics to provide ample tissue support provides inferior clinical outcome as shown in research studies.

From both a clinical and laboratory perspective it can therefore be concluded that custom implant abutments offer the best possible treatment option for patients today. <



NobelProcera Software for the design of custom abutments includes valuable visual information on the abutment/gingiva interface.



Guaranteed satisfaction

- Lifetime warranty on all Nobel Biocare implants including prefabricated prosthetic components.
- Five-year warranty on all NobelProcera individualized restorations.*

Serving you and your patients
in the best possible way.



Redefining the Gold Standard

Ask yourself, "What is the best way to restore the patient functionally, esthetically and biologically today?"

By Dr. Steven Lewis

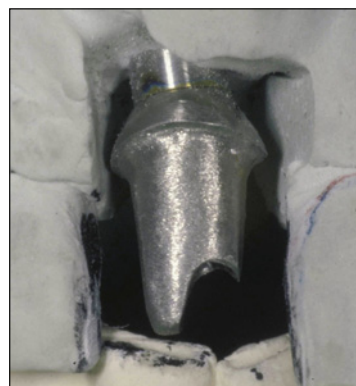
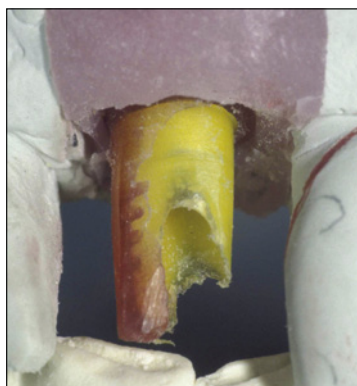
As relatively early Brånemark System adopters in North America, our team at UCLA went full-speed into offering this treatment modality to patients with an edentulous arch. Proven predictability, accompanied by an extremely low potential for morbidity, gave rise to great working relationships between the surgeons, prosthodontists and dental technicians providing this new form of treatment. By the mid-1980s, Brånemark and his colleagues had developed a complete system of inter-related components for the treatment of the edentulous arch, which even made it possible to treat severe craniofacial defects resulting from trauma, tumor ablation or congenital disfigurement.

When treatment began to be offered to the partially edentulous patient, new clinical challenges were encountered that the available components were not designed to address. For instance, the partially edentulous patient sometimes presented with much less interarch space than the average edentulous patient. At the time, the shortest trans-mucosal abutment available was 4 mm, and required a 4 mm gold cylinder on top of that to make a cast framework. Prosthetic complications arose because there wasn't always enough interarch space left to accommodate an adequate amount of restorative materials.

There were other problems too. In an attempt to provide an esthetic restoration in the maxilla, using the shortest 4 mm transmucosal abutment sometimes resulted in visually exposed titanium. Additionally, even when working with top surgeons, the occasional implant/abutment access hole ended up in an esthetically compromised position due to facially inclined implants.

It should be recognized that the Brånemark System, as introduced in the early 1980s, remains an ideal system today if used only to treat edentulous jaws with moderate to severe resorption; the fact that 15 years documentation for the maxilla and 20 years for the mandible were published, confirms the continued viability of Brånemark's design rationale and the durability of this treatment.

Nevertheless, to meet the specific challenges mentioned earlier, the UCLA abutment, introduced in 1987,



UCLA abutment approach: With a GoldAdapt as foundation, the abutment cylinder is modified and added to with wax, which is then burned out and cast to produce the abutment for a cemented crown. With a stock component and wax, any abutment design can be produced that is mechanically compatible.

provided unique advantages. This component made it possible to bypass the standard abutments and gold cylinders of the day by bringing the restoration directly to the implant. With the UCLA abutment:

- single tooth restorations could be fabricated utilizing the implant hexagon;
- porcelain could be brought closer to the implant head;
- the occasional labial trajectory of a screw access hole (that might otherwise interfere with an esthetic outcome) could now be corrected with a cast abutment and a cemented crown covering the screw access hole; and
- less space was required in situations characterized by a limited interarch gap.

Looking back, it is a little surprising that what was designed at the time to be no more than a problem-solving expedient continues to be the primary treatment modality of many dentists and technicians to this day.

Perhaps practical aspects, especially from a dental technician's standpoint, are responsible for the continued widespread use of the UCLA abutment. After all, it makes it possible to take a "one size fits all"

gold cylinder and then wax and cast any type of abutment design appropriate for single-tooth and multiple-unit cemented restorations.

Despite this practical benefit and the fact that I am a member of the team that originally developed the UCLA abutment technique, I use it only rarely today. I still prefer to do screw-retained restorations whenever feasible, but because the multi-unit abutment of today has advantages in both collar height and interarch clearance dimensions over the original standard abutments, I find it a compelling choice. What's more, there are also angled abutments at our disposal today that had not yet been developed in the mid-1980s when the UCLA abutment was first introduced.

For most screw-retained solutions today, I choose multi-unit abutments and a NobelProcera milled titanium framework rather than UCLA abutments.

The UCLA abutment had its day

For single teeth and short-span cementable restorations, the UCLA abutment did allow varied abutment designs and made it possible to design abutments to look like prepared

teeth, which was especially useful for the occasional misaligned implant that needed a cemented crown or bridge.

On the other hand, when these cast gold abutments extend 4 mm or deeper subgingivally, soft tissue seldom appears as healthy as in shallower situations. This should not come as a surprise. The work of Abrahamsson and others demonstrates that one doesn't get the same epithelial attachment to gold as to titanium, aluminum oxide or zirconia.

Given the fact that NobelProcera can provide customized abutments made of titanium or zirconia, making it possible for virtually any design to receive a cementable crown or bridge, there is really no longer any justification for settling for the lesser biocompatibility of gold in these subgingival sites. Today I use only NobelProcera CAD/CAM custom titanium or zirconia abutments for these cementable applications.

When presented with a new case, I always ask myself, "What is the best way to restore this patient functionally, esthetically and biologically?" As I answer this question and choose my materials, I find myself moving away from metallic gold towards a new gold standard: NobelProcera. <

→ More to explore

"Implant treatment in the edentulous maxillae: a 15-year follow-up study on 76 consecutive patients provided with fixed prostheses," by T. Jemt and J. Johansson, in *Clin Implant Dent Relat Res.* 2006; 8 (2): 61–9.

"Implant Treatment in the Edentulous Mandible: A Prospective Study on Brånemark System Implants over More than 20 Years," by J-A Ekelund, L. Lindquist, G. Carlsson, G and T. Jemt, in *Int J Prosthodont.* 2003; 16: 602–608.

"Single Tooth Implant Supported Restorations," by S. Lewis, J. Beumer, G. Perri and W. Hornburg, in *Int J Oral Maxillofac Implants.* 1988; 3: 25–30.

"The mucosal attachment at different abutments. An experimental study in dogs," by I. Abrahamsson, T. Berglundh, PO Glantz and J. Lindhe in *J Clin Periodontol.* 1998 Sep; 25 (9): 721–7.

"The mucosal barrier at implant abutments of different materials," by M. Welander, I. Abrahamsson and T. Berglundh in *Clin Oral Implants Res.* 2008 Jul; 19 (7): 635–41.



NobelProcera CAD/CAM approach: A dental technician can use either a scan of an abutment design or complete virtual process to produce an abutment in either titanium or zirconia. With design possibilities matching the UCLA abutment, more biocompatible materials are able to be used, with the added possibility of shaded zirconia for esthetics.

Solutions for the Edentulous Patient

Esthetics and performance can go hand in hand.

The number of edentulous patients is on the rise. As a group they are becoming increasingly important to every dentist.

By Hans Geiselhöringer

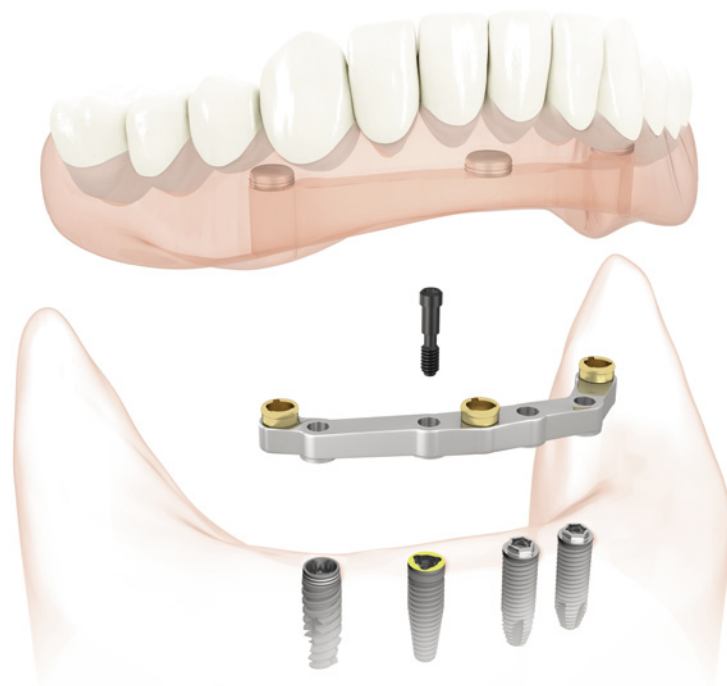
Demographic data indicates that the number of edentulous patients will continue to grow in the years to come, and in a world full of readily available digital information, patients' expectations—as well as their awareness of available treatment options—are increasing at the same time.

Taking each patient's clinical situation, expectations, available time, and financial situation into account, the dental team has to decide first and foremost on the most appropriate treatment protocols and materials to recommend.

Then they must communicate the benefits of competing treatment alternatives and explain the availability of low-cost, yet high-quality, restorative options such as titanium frameworks with acrylic veneering, denture teeth or treatment concepts such as All-on-4, which uses four implants to support an immediately loaded full-arch prosthesis.

Edentulous patients commonly present extensive loss of hard and soft tissue, which can be attributed to a variety of factors, ranging from severe periodontal breakdown to external trauma. Making matters worse, the longtime use of full-arch dentures leads inevitably to atrophy of the alveolar ridges.

While many additive techniques



Bar-retained overdentures—often called, “fixed-removable”—provide for the proper support of extra-oral tissue, which restores facial appearance and esthetics, while providing complete functional stability at the same time.

for the reconstruction of missing anatomic morphology are employed on a routine basis today, surgical intervention may not always lead to the desired outcome. Physiologically, some patients may be poor candidates for extensive grafting, or they may simply decline such treatment on emotional or financial grounds.

In these situations, treatment concepts that make it possible to provide reliable bone-anchored support in minimal volumes of hard tissue become especially relevant, as does the use of soft tissue-colored resin or porcelain in the final restoration.

One promising and fast growing treatment concept is based on the use of bar-retained overdentures

(often called, “fixed-removable”). Overdentures allow for the proper support of extra-oral tissue, which restores facial appearance and esthetics, and provide complete functional stability at the same time. They also allow for easy, fast and simple hygiene maintenance by the patient. This characteristic is recognized as one of the most critical predictors for the long-term survival and success of any implant restoration.

Other considerations

The loading protocol also needs to be taken into consideration. While staging implant therapy over time is a highly predictable option, the ex-

traction of remaining teeth and roots, simultaneous or delayed implant placement, and immediate provisionalization also represent protocols that are routinely performed with good success.

Loading dental implants immediately after their placement has tremendous advantages for both the dentist and the patient. The protocol results in minimized trauma and immediate esthetics, adequate function, and preservation of hard and soft tissue contours.

The positive psychological benefit for the patient—who is not left with a transitional, mostly unacceptable denture—can be very substantial indeed.

In this context, the All-on-4 concept—whose reliability has been substantiated by extensive long-term documentation and scientific evidence—provides not only an immediate provisionalization protocol, but also a definitive treatment solution.

No matter which clinical protocol is selected, the manufacturing and quality of the definitive restoration is of fundamental importance for longevity, as functional forces acting on the prostheses are extensive.

When combined with aligned centralized milling strategies, computer-aided design (CAD) offers many advantages over conventional manual laboratory manufacturing techniques. Among these advantages are fit, material quality and reliability. The NobelProcera System provides custom-design options for frameworks made of titanium or zirconia.

The extent of atrophy, the amount and quality of bone and soft tissue available, and the inter-occlusal dis-



The quality, precision and cost efficiency associated with state-of-the-art CAD/CAM production keep overdenture solutions competitive.

tance are all factors that need to be taken into consideration when choosing between a fixed and removable implant-retained restoration—as are the anticipated number and position of implants and the clinical protocol preferred by the restoring dentist.

Whether the restorative team decides to proceed with superstructures made from zirconia and ceramic veneering on a large span or in multiple sections, or a cost-saving NobelProcera Implant Bridge made of titanium—finished with composite resin or conventional denture teeth—, they can be sure they are working with the best possible quality.

Thanks to these products and services from Nobel Biocare, poor fitting frameworks and the need for chair-side sectioning and soldering are a thing of the past! <

Nobel Biocare Wins “Best Medical Website”

Competing in a large field of international competitors, Nobel Biocare is honored for its well-conceived and well-executed website.

On September 15, the international Web Marketing Association presented Nobel Biocare with its 2011 “Best Medical Website” award on the basis of superior design, innovation, content, technology, interactivity, copywriting and ease of use.

Open to all organizations and in-

dividuals involved in the process of developing websites for organizations, companies and government, the international Web Award Competition recognizes outstanding website development and online communication in virtually every field. Taking home the honors for Best Medical website called for the effective fusion of form and function.

The Nobel Biocare website won particular recognition for its useful course finder feature, which presents



available dental courses from all around the world, both on dental implants and prosthetic restorations. The quality of the site's content and the use of technology to communicate that content were also cited as decisive aspects of nobelbiocare.com/dental.

“The Nobel Biocare Dental Professionals website is a key communication channel and a cornerstone for information not only for Nobel Biocare but the entire dental industry,” said Nicolas Weidmann, Senior VP

Global Communications. Acknowledging the award, he added, “Our website will build on this success and stay at the forefront of technology, design and content.”

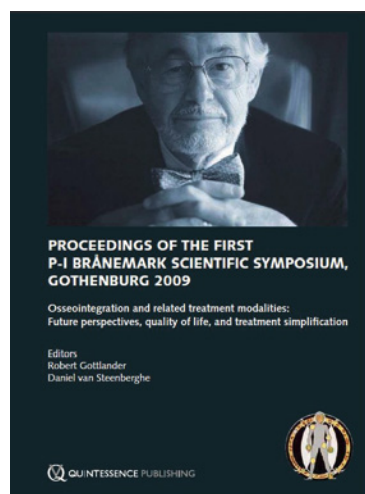
Now in its 15th year, the Web-Award is the premier international annual website award competition, naming the best websites in 96 industries each year and thereby setting the standard of excellence for all website development. <

→ More to explore
www.iacaward.org/winner.asp?eid=16103

Essential criteria

Optimal function and esthetics require comprehensive treatment planning. Criteria for esthetically pleasing, long-lasting, and well-functioning implant reconstructions are:

- Meticulous examination, diagnosis, and treatment planning with a full-contour wax-up, following basic esthetic principles, function, and phonetics.
- A properly planned and appropriately fabricated CAD/CAM framework adhering to biomechanical principles and providing passive fit.
- An easy-to-handle restoration to expedite treatment and facilitate hygiene.



Proceedings of the First P-I Brånemark Scientific Symposium, Gothenburg 2009

Per-Ingvar Brånemark's discovery of osseointegration in 1952 changed the field of dentistry forever, creating a world of possibilities for dental reconstruction.

The First Brånemark Symposium, held in 2009, honored the lifetime work of Brånemark, promoting cooperative efforts among and between medical and dental disciplines. This richly illustrated book of proceedings

S&E

Safety and Efficacy

from the symposium features a vast array of knowledge related to osseointegration, such as mechanobiology, nanostructured surfaces, orofacial reconstructions, and orthopedic applications.

Edited by Drs. Robert Gottlander and Daniel van Steenberghe, it also features information regarding associated diagnostic and treatment modalities, such as full-ceramic crowns, CAD/CAM techniques, and guided surgery applying cone beam computed tomography.

Quality-of-life considerations and treatment simplification are also discussed.

The symposium was held in Professor Brånemark's hometown of Gothenburg, Sweden. Osseointegration experts and opinion leaders from all over the globe attended.

The proceedings offer cutting-edge insight from these experts, making it the perfect choice for the student, researcher, or clinician who wants to better understand the concept of osseointegration, its many applications, and its influence in dental and medical world of today.

And please note: a follow-up symposium will be held in Gothenburg next March.

395 pages hardbound
ISBN 978-1-85097-207-9

Understanding the Integrity of Implant System Design

Careful treatment planning, meticulous surgery, proper prosthetic design and occlusion, and patient hygiene all contribute to long-term dental implant success.

By Steve Hurson

Equally important is the inter-component integrity of the implant system, which can help to prevent such complications as screw loosening and fatigue fracture of the components.

Nobel Biocare implant systems are designed with all components working together in harmony to ensure long-term integrity of the systems. Two examples of this are the NobelReplace Tapered Ø4.3 product line and the NobelReplace Platform Shift NP-Ø4.3 product line.

The NobelReplace Tapered Ø4.3 product line, developed in 1998, is suitable for all applications throughout the mouth but was specifically designed with the high strength and stability necessary for single-tooth restorations.

To ensure high strength and stability – design, materials and surface modifications all play important roles:

1. Long engagement of the abut-

ment into the implant helps resist lateral tipping forces, which cause screw loosening.

2. The TorqTite abutment screw achieves a high preload.
3. Implants are manufactured from special high-strength cold-worked Grade 4 Pure Titanium for high fatigue strength.
4. Abutments are manufactured from high-strength titanium alloy and zirconia.

At the core of the NobelReplace Tapered Ø4.3 system design is the TorqTite screw, a unique technology proprietary to Nobel Biocare. The TorqTite screw achieves double the preload of a standard titanium alloy screw. In Mechanical Engineering Design, Joseph Shigley writes, "The importance of preloading of bolts cannot be overestimated. A high preload improves both the fatigue resistance of a bolted connection and the locking effect."

The recently developed NobelReplace Platform Shift NP-Ø4.3 system presented a unique design challenge of applying NP (Ø3.5) abutments to the NobelReplace Tapered Groovy Ø4.3 implants. Through careful design optimization of each of the components, high fatigue strength equivalent to the original RP system was achieved with this system as well.

Many companies are making copies of the NobelReplace product line



and making claims of compatibility with that system. Recently, the compatibility of one such company's RP and NP titanium abutments were fatigue-tested with NobelReplace Tapered Groovy Ø4.3 implants and NobelReplace Platform Shift NP-Ø4.3 implants respectively. The testing was conducted to the ISO 14801 standard by an independent laboratory. The results can be seen in the adjacent bar diagram.

The fatigue strengths shown have been normalized to 100% for the respective NobelReplace system abutments and abutment screw. As shown in the graph, the fatigue strengths of both systems suffered when the third-party abutments and screws were combined with the NobelReplace original implant.

It may be tempting for the clinician or dental laboratory to substitute low-cost, third-party components for original components to save expense. As can be seen in the test results, this jeopardizes the integrity of the entire implant system.

Higher incidences of screw loosening and possible fatigue fracture of the components will cost the care provider far more in terms of expense, lost chair time and—not least of all—lost good will with the patient, than is saved with the use of third-party components. <

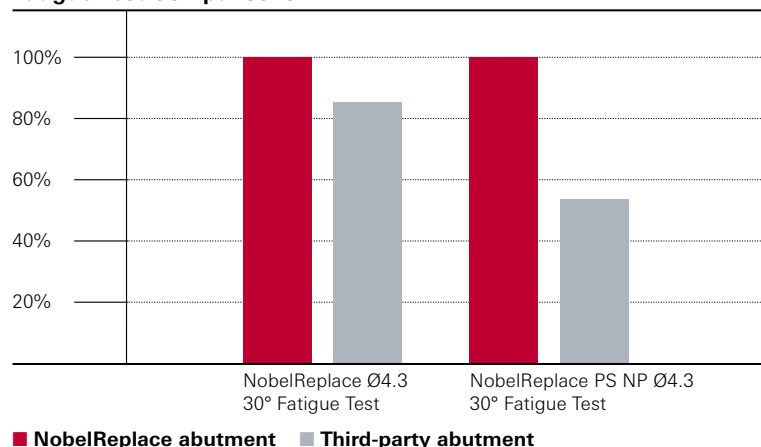
→ More to explore

"Resistance of Internal-Connection Implant Connectors Under Rotational Fatigue Loading," by A. Wiskott, R. Jaquet, S. Scherrer and U. Belser, in Int J Oral Maxillofacial Implants. 22, 2007; 249–257.

"Implant-abutment interface design affects fatigue and fracture strength of implants," by L. Steinebrunner, S. Wolfart, K. Ludwig and M. Kern, in Clin. Oral Impl. Res. 19, 2008; 1276–1284.

"Mechanical Engineering Design," by Joseph Shigley. New York: McGraw Hill, Inc, 1977.

Fatigue Test Comparisons



New Lifetime Warranty



Earlier this year, Nobel Biocare instituted a new lifetime warranty to make it easier for customers to do business and to instill peace of mind.

In the rare and regrettable event of a product failure, Nobel Biocare extends a lifetime warranty to cover all the company's implants, as well as prefabricated prosthetic components, if restored.

In addition, all NobelProcera individualized restorations are covered by a five-year warranty regardless of the implant platform (excluding temporary acrylic restorations).

In all instances, products will be replaced at no additional cost. For detailed warranty information, please visit us online at the address on the right.

Listening to customer feedback is essential for providing the highest possible level of support. Our lifetime warranty is just another sign of our responsiveness as we serve our customers and their patients in the best possible way.

Please contact your local Nobel Biocare representative at the numbers listed on the following page for more information regarding customer support and other services. <

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Nobel Biocare University Partners

A Creative Approach to Higher Education

Karolinska Institutet of Sweden becomes a Nobel Biocare University Partner.

> Stockholm, Sweden

By Anne Berit Heieraas

Nobel Biocare has recently committed resources to provide support for the undergraduate dental education program at Karolinska Institutet in Stockholm, Sweden.

One of Europe's most prominent medical universities, Karolinska Institutet, is perhaps best known abroad

as the home of the Nobel Assembly, fifty distinguished professors, who choose the Nobel Prize laureate in Physiology or Medicine each year.

Global outreach

"We are very proud to enter into this collaboration with Karolinska Institutet and look forward to long and fruitful cooperation," says Ingo Braun, Global Head of Clinical Research at Nobel Biocare headquarters.

Since 2004, Nobel Biocare has entered into a series of agreements with universities around the world in order to encourage dental schools to implement advanced implant education programs.

With the support of Nobel Biocare, select universities have incorporated implant therapy, treatment planning and diagnosis—as well as digital dentistry—into undergraduate dental education curricula, thus promoting optimal patient care. To stimulate the exchange of knowledge, initiative and experience, Nobel Biocare University Partners also become part of a dynamic communications network comprised of many of the world's leading dental universities.

A helping hand

The collaboration with Karolinska Institutet includes various forms of support, such as training in a variety of implant and prosthetic solutions, treatment planning and guided surgery, both for students and faculty at this influential institute.

"This agreement enables us to offer our students know-how of some of the best treatment solutions the dental industry has to offer," says Professor Kaj Fried, Chairman of the

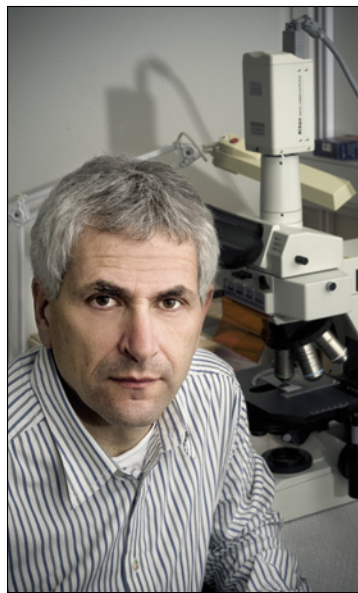


Photo: Johan Bergmark

Professor Kaj Fried, Chairman of the Department of Dental Medicine at Karolinska Institutet.



Photo: Camilla Svensk

Well educated students, like these at Karolinska Institutet, are learning innovative techniques to provide optimal care.



Photo: Camilla Svensk

Behind these walls, the Nobel Assembly, a group of fifty distinguished professors, chooses the Nobel Prize laureate in Physiology or Medicine each year.

Department of Dental Medicine at Karolinska Institutet.

Professor Fried's department conducts research and offers education in dentistry, dental hygiene and dental technology. It also operates a student clinic open to the public. The department is made up of approximately 250 employees, 500 undergraduates and 40 PhD candidates. <

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For more information about the Global University Partner Program, and how it drives innovation in education by helping institutions better leverage their resources, please visit our website: www.nbgupp.org/



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