What are the advantages of lasers over rotary cutting instruments, and are there limits to what a laser can do?

There are some limitations as to what can be done with a laser, like the removal of metal restorations and crowns. But if you consider the totality of the types of treatments offered by general dentists, these limitations are far less compared to conventional rotary instrumentation. For example, you could run into problems with soft tissue contours or bone levels associated with a deep cavity while cutting tooth structure. With a laser you can remove both bone and soft tissue by simply changing a setting, and you are therefore able to complete the procedure in one appointment—something that cannot really be done with a high-speed drill. Generally speaking, what can be done with a drill, scaled, or bone bur can also be done with a laser. Additionally, many patients have a fear of dentistry based on the sounds and vibrations associated with rotary instruments. These sensations do not occur with the laser, meaning the patients find treatment much more acceptable.

What role does laser fluorescence detection currently play in the prevention of caries?

With the advent of the KaVo Diagnodent, which was introduced about a year ago, the first general dentistry application of laser technology was introduced. Like with any new technology, it has to be understood first, in order to achieve the best results.

In order to provide patients with accurate treatment recommendations based on the results of early cavity detection, an understanding of minimal invasive caries is essential. Otherwise, the profession can be open to claims of overtreatment. These charges are aggressive from the patient's understanding of the technology, its accurate application, and the consequences of minimally invasive treatment. Often, astute clinicians are at the forefront of the application of new technology. They are the torch-bearers to the research literature struggling to keep up with the clinical pioneers. This leads to a period with a shortage of validation for what eventually becomes a new and accepted standard of care. At this stage, many professionals are at a disadvantage in terms of clinical developments in the field are occurring and, as they filter out, many general practitioners and the standards of diagnosis will continue to improve. For new technology to be readily implemented in general practice, it has to be both cost effective and time efficient.

The most common complaint from a new user is that it will not cut fast enough. The most significant comparison to slow cutting rates is the user, not the technology. The biggest hurdle a dentist faces when beginning with a laser is the difference between rotary instrumentation and lasers. When this is understood, a new laser dentist can become competent in a very short time. If these concepts are not well taught, then the new user will become frustrated and may fail to integrate their new laser into their treatment regimes.

The three concepts that you should concern yourself with are:

1. What is the advantage of using the Waterlase (Er,Cr:YSGG) in the dentistry field to the efficacy of their treatment?

2. What is the difference between a laser that can be used for debridement and disinfection compared to the current settings?

3. How is the concept of laser fluorescence detection curative in dental practices in the near future.

What is the advantage of using the Waterlase (Er,Cr:YSGG) in the dentistry field to the efficacy of their treatment?

The second concept is that what you see the use of the laser in general dental practice developing in the years to come?

The multiple applications of lasers are only going to expand in the future. At the initial introduction of the high-speed hand piece, there was initial and significant resistance to the technology, and it took over 10 years before it was widely accepted. The same principle applies with lasers. Any new technology can become very successful if education is not done properly. The concept of laser endodontics and peri-implantitis is highly controversal.

When using a high-speed bur, we tend to move the bur laterally to extend a cut. This does not work with a laser because it is not cutting, not side cutting. Therefore, the operator needs to learn a new way of pointing the laser directly in the direc- tion where a cut needs to be extended. Anyone who has become competent in the use of air abrasion mastering the laser very quickly because of the same concepts apply to both technologies.

The second concept is that slow is fast. One concept is that slow is fast and it means that the pulsed Nd:YAG laser is an excellent maneuvering tool in removing filling materials. The concept is that the pulsed Nd:YAG laser can be used to remove composite and silver amalgam fillings in a more controlled manner. Therefore, the use of the pulsed Nd:YAG laser is advocated for clinical use.

The third concept is that when enamel is treated with a laser, it requires a mental awareness to slow the motion of the tip, to allow ablation to occur. As competence increases, the phenomenon is used to control the cutting rates and having to alter laser settings, by increasing or decreasing the power of the laser.

The fourth concept is focusing and defocusing the beam, to alter ablation rates without the high cost of a laser prism in relation to the plane of the ablation face. Ablation rates and cutting rates change when enamelprisms are ablated. They do so very quickly on their ends. Then this re- quires an understanding of the relationship of the angle of enamel prisms in different locations and situations.

The culmination of this under- standing is epitomized in the time a laser dentist has to become a competent laser clinician to cut a slot preparation, with a new user often taking more than three times as long to complete the same procedure.

Recent research on shorter wavelength lasers or the so-called blue lasers has shown them to be effective in diagnosing cancer cells. With this research, if you see the use of the laser in general dental practice developing in the years to come?

The theories of vortex are minimal intervention with minimal adverse effects. This technology, if validated, should reduce the morbidity associated with certain medical conditions, such as cancer surgery, becomes cost effective and can be implemented in general dentistry. The main issue is that the knowledge that becomes difficult for the clinician to incorporate into a practice. I envisage, in the near future, a diode based laser that will have multiple, switchable frequencies that will allow one unit to accomplish different tasks that require different frequencies. As up- dates, costs will decrease, and we may even see the laser grow to a greater proportion of the profession.

Do you expect lasers to be an essential part in every dental practice in 10 to 15 years?

The Business of Dentistry

Come Encounter the Cutting Edge of Implantology and Esthetic Dentistry at
IDEM Singapore Scientific Congress

April 16-18, 2010

Dr. Graeme Milicich

The applications of lasers are only going to expand.
Lights off.
The world’s largest trade fair for dental medicine and dental technology offers endodontologists an outstanding opportunity to discuss the technical and economic aspects of modern concepts in endodontics in detail with specialists from exhibiting companies. Many of the innovations created by endodontists are the result of the past few years being further developed by businesses in the dental industry resulting in new instruments and tool systems. New lesions of the root canal are diagnosed and shown all treated better. For example, modern ultrasound imaging procedures are used to locate the root canal precisely and measure its length right to the apex, as well as to provide exact control of the file position during preparation. High-resolution introral cameras that are connected to monitors and which enable documentation and diagnosis of endodontic treatments using views of the root canal are also available.

"The fascinating scientific and technological advances in the area of endodontics have greatly improved the chances of long term tooth preservation and also make this specialist area one of the significant components of prophylaxis-oriented dentistry," said Dr. Martin Richter, Chairman of the VDDI (Association of German Dental Manufacturers).

Tooth preservation using endodontic measures has become increasingly important in modern dentistry with treatments that have been carried out in compliance with regulations achieving success rates—based on evidence—of between 68 and 85 per cent. The spectrum of methodologies in conservative treatment ranges from manual or mechanical root canal prepa-
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ration, disinfection and obtu-
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ration, to the revision of the root canal should it become neces-
sary and minimally invasive, microsurgical concepts for the treatment of particular endodontic lesions.

Dentists have a number of different options available for root canal preparation: classic manual file systems or rotating instruments, particularly those made of break-resistant nickel-titanium alloys, as well as time-saving mechanical preparation. Preparation is carried out safely through the use of motors, which increasingly use electronically controlled torque limiting or variable oscillations. This means the files remain intact over their lifetime.

Root canal rinsing for cleaning and disinfection using effective chemical preparations can now be supplemented by hydrodynamic procedures. For obtura-
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For clinically complex problems, endodontists are offered complete systems that also contain files with special geometries for the revision of treated root canals. As a last re-
sort—for root tip resection, for example—there are powerful magnifying glass systems or surgical microscopes available for minimally invasive endodontic microsurgery for skilled experts.

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IDS shows current trends in endodontics

New instrument and tool systems increase success of treatment

Root canal rinsing for cleaning and disinfection using effective chemical preparations can now be supplemented by hydrodynamic procedures. For obturation, as well as the classic methods, there are modern sealers and adhesives made of composites, which also enable resilient root restorations if needed. Fiberglass reinforced polymer or metal post systems for stable fixation can also be used, in addition to any necessary prosthetic treatments.

For clinically complex problems, endodontists are offered complete systems that also contain files with special geometries for the revision of treated root canals. As a last resort—for root tip resection, for example—there are powerful magnifying glass systems or surgical microscopes available for minimally invasive endodontic microsurgery for skilled experts.

For dentists that are wanting to start in endodontics as well as specialists in orthodontic treatment, a visit to the 3rd International Dental Show is an exceptional opportunity to become more familiar with the entire spectrum of this fascinating area," said Dr. Markus Heibach, Managing Director of the VDDI.

Furthermore, there has been progress in the field of implantological instruments, such as atraumatic forceps, that are gentle on alveolar tissue or improved hollow cylinder osteotomes.

Visitors to the show in Cologne will also be confronted with a wealth of solutions adapted to the respective indications and enabling them to choose the right ones for their practice. Optimised procedures for preserving the alveolar process, but also for augmentation or alveolar dis-


traction osteogenesis are on display. Another focus will be on state-of-the-art biotechnological procedures for osseogene-
sis including adult stem cell technology. Several manufac-
turers will be showing their latest developments for using bone marrow stem cells and other osteogenic factors and their integration in what are referred to as scaffolds (support membranes). Intramembrane resorbable rods or membranes, in some cases made of collagen or mucous membrane material are just some of the new topics to be addressed during IDS.

In the International Dental Show, the world’s largest trade fair for dentistry and dental technology that will be taking place in Cologne from 24 to 28 March 2009, is the ideal opportunity for trade visitors from dental practices and laboratories to inform themselves comprehensively in discussions with specialists from exhibiting companies and experienced users about the range of modern implant concepts," says Dr. Markus Heibach, President of the VDDI.

Dental implants market continues to grow

Ossogenesis and stem cell technology find their way into specialty

The study goal was to deter-
mine the level of bone loss over time at the implant sites they observed. The goal was to determine whether bone loss would occur, but how much bone loss should be considered normal and acceptable.

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Today international

Our today editorial team will recapitulate, analyse, and review all main innovations, events, and scientific topics in this special edition.

Distributed free of charge at all points of entry to the trade fair, within the exhibition halls and in official trade fair hotels, every visitor gets a comprehensive overview of the constantly growing trade show.

See the latest edition of today IDS at:
www.dental-tribune.com
High performance materials for perfect aesthetics on display

At IDS 2009, dentists and dental technicians will gain a comprehensive overview of modern veneers that offer aesthetic improvements, particularly in the area of front teeth, the organiser Koelnmesse has announced. Products made from the high-performance ceramic zirconium oxide and its layered or pressed-ceramic veneers represent one of the most ambitious areas in dental prosthetics. In the area of aesthetically pleasing acrylic veneers, materials are also being developed. The latest composites materials do not offer unknown abrasion strength but also necessary colour fidelity to perfect high-quality substructure constructions.

Veneers can be manufactured from pressed ceramics, high-fusion veneer ceramics and from plastic, making this a challenging specialist field for dentists and technicians. The increasing demand for high performance ceramics, as well as for alternatives to the full-field ceramics or precious metals blended with the latest synthetic materials, shows that an increasing number of patients want the best for their oral health and are prepared to invest in it—even going as far as expensive, implant-born suprastructures that resemble natural teeth in their appearance.

Along with the advancements of ceramics, there have also been almost revolutionary changes in laboratory operations. Until recently, only large companies could mill substructures out of zirconium oxide, but now smaller companies and even practice laboratories can participate in the developments in all-ceramic, high-performance materials.

Prosthetics

Dr. Markus Heibach, Managing Director of the VDTI is convinced: "In this current climate of change, the winners will be those who find out more now at IDS and understand how to use the upcoming opportunities strategically for their business." Visitors will find all of these new opportunities to be presented in Cologne, and will be able to use them to make sensible decisions for their own laboratory or practice, he added.

Prosthetics play an increasing role in the future of dentistry, mainly because the population ages in most countries. Digital technology is being constantly incorporated into production processes and through it, technicians have improved options at hand to work more efficiently and establish new procedures in laboratories. Accurate casting, however, remains a critical issue. Modern casting materials offer high precision and processing security in this process that is crucial for the accuracy of any restoration.

Today’s high-tech tooth replacements are of the highest quality and biocompatible with full-ceramic restorations. The high-performance ceramic zirconium oxide in particular is characterised by a broad range of indications and high aesthetics with practically no visible difference compared to natural teeth. CAD/CAM processes are most frequently used to process it, but the substructure construction can also be done using traditional wax modelling followed by the CAM process.

Metallic prosthetic materials have always been important as base-on-alloys with a high gold content for crowns and substructures and are used mainly with the established casting technology. Substructure constructions, however, are increasingly being manufactured without precious metals—usually as heavy-duty cobalt chromium alloys or fully biocompatible in titanium using modern CAD/CAM. Selective laser melting has been established as the latest alternative digital production technology. It uses metallic powder alloys that are usually free from precious metals for prosthetics. Restorations made with this technology are characterised by their accurate fit and resilience.

With respect to substructure constructions, crowns and abutments, there are various high- and low-fusion veneer ceramics for both the layering and overpress techniques. In addition, new abrasion-resistant composite plastics are also being used now for the aesthetic veneer. Progress has also been made with the important adhesives used for fixing restorations or suprastructures. The trend is moving towards process-safe single-bottle adhesives which have been shown to perform the same way as classic bonding materials.
The CAD/CAM Evolution

Computers in practice and laboratory will determine action, Prof. Albert Mehl, Switzerland

...on more powerful computers has clearly improved. Based on virtual construction models and articulation on Windows desktops, biogeneric occlusal surface design with intelligent software, as well as rapid prototyping, and 3D printing are just some of topics increasingly mentioned in lectures and publications dealing with CAD/CAM. Already, proven and effective measuring techniques developed in the 1990s, it was possible to adapt 3D recording/imaging systems to the needs of dentistry and simplify their operation. Continued development of CAD software enabled a multitude of construction options (Fig. 1) and an improvement in the quality of the grinding/milling units. Economic efficiency, combined with high quality restoration is the current hallmark of CAD/CAM technology. It is not only dentists and dental engineers who benefit from standardisation and excellently controlled treatment and manufacturing methods, the patient does as well.

What is the latest in CAD/CAM development? Anyone well acquainted with the field predicted early on that manufacturing centres would play a crucial role. High capacity utilisation, specialised staff, in milling procedures and, just recently, the laser sintering of metals is often completely forgotten. The manufacture of metal restorations (eg, non precocious metals, titanium, or gold alloys) will thus eventually become a domain of CAD/CAM technology.

What does the future of CAD/CAM technology hold? Introral 3D measuring will at least in part make the impression-free practice possible (Fig. 4). The speed, operation, and precision of the images are being continually improved and the measurement range expanded. Once a 3D data set of tooth surfaces has been stored, a completely novel form of dental diagnostics can be conducted, by comparing data that were recorded at different time points. Thus, quantitative, 3D progression control of orthodontic treatment, the analysis of erosion and abrasion, peri-implant mucosal changes, or intervention planning is possible.

A distinct advantage of computer-assisted procedure over the conventional wax-up technique also lies in the functional and morphological occlusal surface design. Complex algorithms can store an immense amount of basic knowledge about tooth structures and individual ge-
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