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international magazine of endodontics

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Steve Jones

Co-chairman
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ROOTS SUMMIT 2024

Welcome to the first 2024 issue of roots **magazine**. Under the direction of Dr David E. Jaramillo, ROOTS SUMMIT has long prided itself on being able to provide the highest ethical level of practical science which can immediately be applied to clinical practice. This year is no different.

In addition to this, ROOTS events for the past 25 years have been a proving ground of sorts for many clinicians who began their endodontic careers by speaking during the case presentation portion of our programme or by presenting a poster. The list of names is too lengthy to include everyone, and I would feel terrible if I missed any on the list, so I will focus only on those featured in this issue.

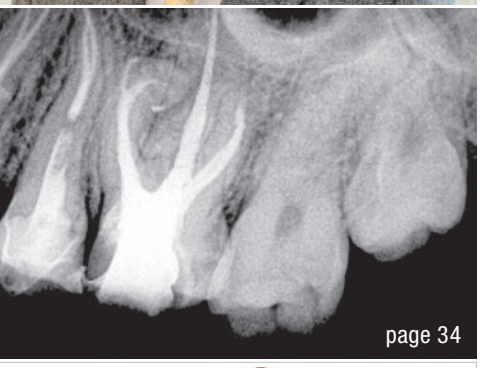
Let's begin with our headline speaker and native of Athens in Greece, Dr Antonis Chaniotis, whom I had the pleasure of first meeting in 2012 at ROOTS SUMMIT in Foz do Iguaçu in Brazil. Known for his expertise in canal blockage negotiation, he shares insights in the interview titled "The concept of the root canal blockage course was born out of the desire to teach and practise different techniques". In this interview, he also shares his journey with ROOTS SUMMIT. Additionally, Dr Rajiv Patel, a long-time ROOTS member and speaker, shares the benefits of being part of ROOTS and its impact on his practice in another interview.

Dr Bartłomiej Karaś from Poland, one of our case presentation winners during ROOTS SUMMIT 2022, held in Prague in the Czech Republic, writes about a single-session endodontic and surgical treatment of internal root resorption. My friend Dr Johnny Onori from Spain, a consistent contributor to both ROOTS and our Spanish language Facebook group EndoLatinos, writes about how digital planning can increase the success of autotransplantation of third molars and the use of a 3D-printed bio-replica of the tooth to be transplanted.

Completing this issue are contributions such as "Practical tips for reliable endodontic treatment" by Dr Friederike Listander and "A second chance"—well-described retreatment case reports by Dr Philippe Sleiman.

I hope you enjoy the above-mentioned articles and interviews featured in this issue. In Athens, ROOTS SUMMIT, like always, will be a very special event, and for those able to attend, we are thrilled to have you with us.

Steve Jones
Co-chairman of ROOTS SUMMIT



editorial

ROOTS SUMMIT 2024 — 03
Steve Jones

news

Piezoceramic stack actuator speeds up root canal treatment — 06
Review offers evidence of link between oral microbiome and cancer — 08

ROOTS SUMMIT special

"The concept of the root canal blockage course was born out of the desire to teach and practise different techniques" — 10
An interview with Dr Antonis Chaniotis
"Dental trauma management is not a one-size-fits-all process" — 12
An interview with Dr Rajiv Patel
Lecture programme, abstracts and speaker information — 14

case report

Practical tips for reliable endodontic treatment — 24
Dr Friederike Listander
Utilising R-SWEEPS laser-assisted irrigation for the treatment of chronic periapical periodontitis — 28
Dr Hui Jing Phang
Single-session endodontic and surgical approach to internal root resorption — 30
Dr Bartłomiej Karaś
A second chance — 34
Dr Philippe Sleiman
Increasing success in autotransplanted third molars through digital planning — 38
Dr Johnny Onori

interview

"Retreatments are a unique way to save not only teeth but also the surrounding bone" — 42
An interview with Dr Ahmed Shawky el-Sheshtawy

features

Doubled-edged sword: AI must foster, not worsen, sustainability in dental care — 44

industry news

X-Smart Pro+: "Ensuring safety while going much faster" — 46
High-quality instruments for forward-thinking dentists — 48
Zumax Medical: From endodontics to general dentistry — 50

manufacturer news — 52

meetings

Long-awaited Digital Dentistry Show to premiere in Berlin in June 2024 — 54
International events — 56

about the publisher

submission guidelines — 57
international imprint — 58

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Celebrating **20 years** of **Dental Tribune International**

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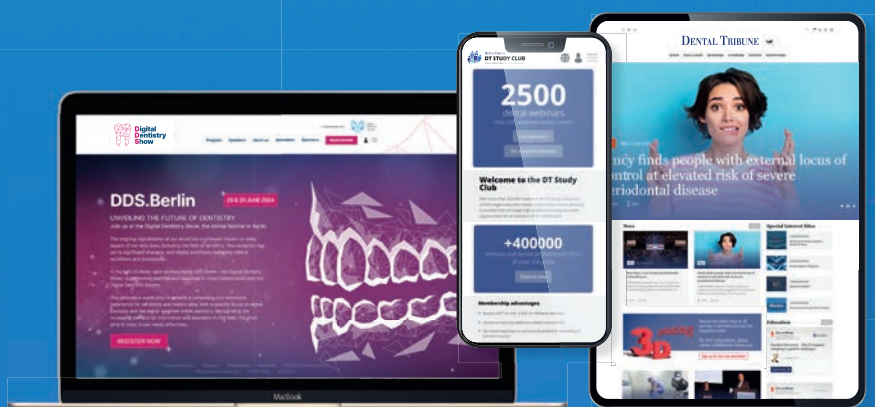
For **20 years**, Dental Tribune International has been at the forefront of dental media, education, and events, shaping the global landscape of dental knowledge dissemination. With a presence in over **90 countries**, Dental Tribune International stands as the world's largest dental network, connecting professionals and industry representatives across the globe. Our commitment to providing essential information to the dental community is unwavering. Since our inception in Leipzig, Germany, in 2003, Dental Tribune International has flourished into a powerhouse. Our integrated approach merges print, digital, and educational media, offering a myriad of marketing channels to engage with the vast dental community worldwide. As we celebrate this milestone, we proudly merge our anniversary with our esteemed German forerunner company, OEMUS MEDIA. With roots dating back to 1994, OEMUS MEDIA has evolved into a pivotal player and trusted partner in the dental landscape, setting trends and standards in the German-speaking markets. Together, Dental Tribune International and OEMUS MEDIA bring forth over **50 years** of collective industry expertise, reflecting our commitment to innovation, quality, and service excellence.



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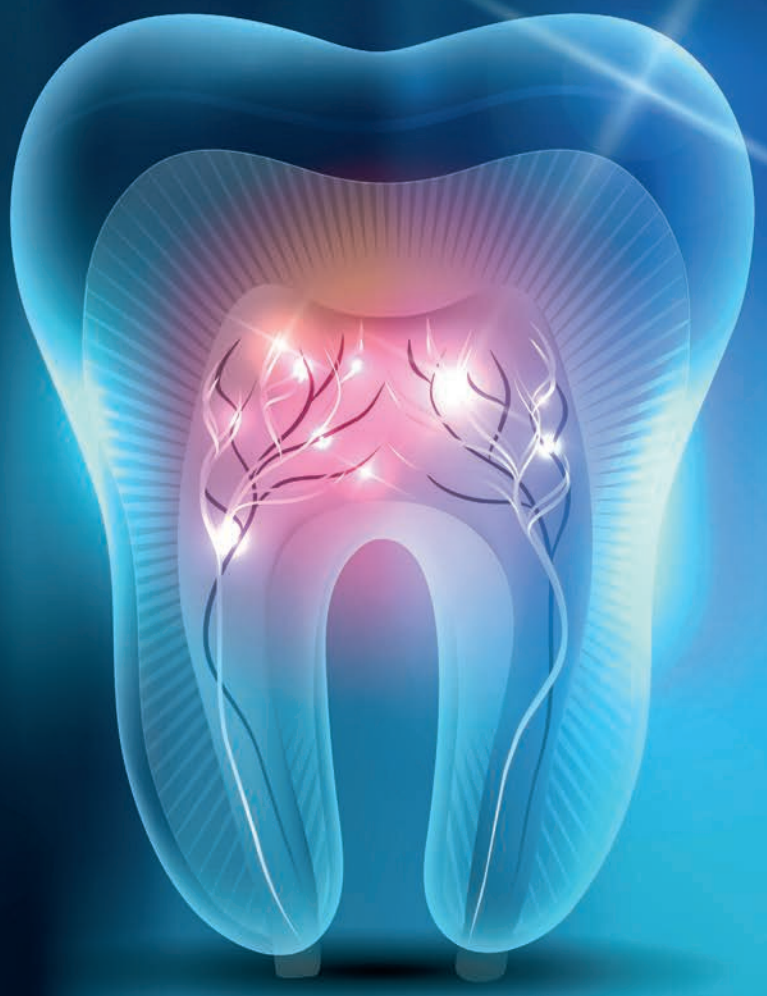
Piezoceramic stack actuator speeds up root canal treatment

Franziska Beier, Dental Tribune International



In Germany, approximately seven million root canal treatments are performed annually.

A common challenge faced during root canal treatment is the frequent jamming of the rotating file, necessitating regular cleaning. Addressing this issue, researchers from the Fraunhofer Institute for Ceramic Technologies and Systems (IKTS) in Dresden and the Department of Dentistry at the Rostock University Medical Center have developed a piezoceramic stack actuator that allows for quicker and more efficient patient procedures.

In Germany, approximately seven million root canal treatments are performed annually. Despite dental files being made from a superelastic nickel-titanium alloy, there is a high risk of these files breaking under stress, necessitating their frequent removal and thorough cleaning.

The newly developed device overlays the file's rotation with axial vibration in the ultrasonic frequency range. The aim is to reduce the risk of file breakage and improve the efficiency of root canal treatments.

Advantages of the piezoceramic stack actuator

Dr Holger Neubert, head of the Department of Smart Materials and Systems at Fraunhofer IKTS, said in a press release: "By overlaying the rotation with axial vibration, the file gets clogged less quickly, meaning that it doesn't need to be cleaned so often. Dentists are then able to concentrate much more on their complex

"The newly developed technology holds promise for a range of medical applications beyond dentistry, including applications in diagnostic imaging and cancer treatment."

work in the root canal. The risk of the file breaking is also reduced."

He added: "The core idea of combining the two motions of the dental file came from the specialists at the Department of Dentistry at the Rostock University Medical Center. We used piezoceramic stack actuators as the drive element because they are most able to meet the special requirements for vibration amplitude and frequency, size as well as supply voltage."

Piezoceramic-based actuators bring numerous benefits. Their compact size and rapid, precise operation make them highly efficient and offer ease of control and minimal heat loss. These actuators are composed of multiple layered segments that collectively enhance displacement, allowing for a design that is sufficiently small to navigate the tightest spaces in a patient's mouth. Additionally, the research team constructed the stack actuator from lead-free materials, adhering to the future requirements of the European directive on the restriction of hazardous substances in electrical and electronic equipment.

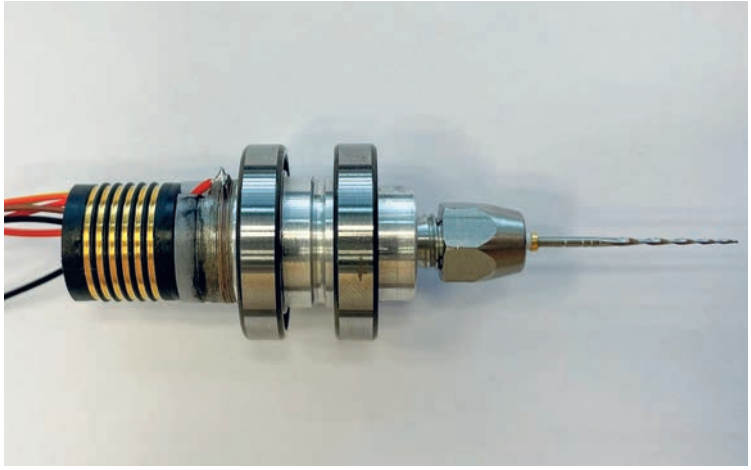
Dentists at Rostock University Medical Center conducted trials of the new technology on artificial teeth and obtained positive results.

Additional medical engineering applications

The newly developed technology holds promise for a range of medical applications beyond dentistry, including applications in diagnostic imaging and cancer treatment. Researchers are exploring its use in low-frequency ultrasonic transducers, which offer high penetration depth for tomography. Advances in piezoceramic transducers have led to their miniaturisation, allowing as many as 2,000 units to be incorporated into a standard-sized tomography system. This facilitates the high-resolution 3D imaging crucial for medical diagnostics.

In addition, high-frequency ultrasound transducers are becoming increasingly valuable in fields like dermatology for their ability to provide precise images at shallow depths. Further potential lies in high-performance ultrasonic transducers designed to target and destroy specific tissue areas with focused sonic waves, a technique particularly relevant in cancer therapy.

"Piezoceramic components can be used in a wide array of applications and, thanks to their compactness and performance, are ideal for medical engineering. We are able to develop custom solutions to suit the needs of individual clients," emphasised Dr Neubert.



Dental file with integrated piezoceramic stack actuator. *(Image: © Fraunhofer IKTS)*

Review offers evidence of link between oral microbiome and cancer

Iveta Ramonaite, Dental Tribune International

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Prof. Georgios Belibasakis.

The oral cavity represents a complex microenvironment where a diverse microbial community flourishes. A recent review study, carried out by researchers at Karolinska Institutet in collaboration with researchers in South Korea, Sri Lanka and Australia, has recently taken a deeper look at oral microbes and their potential impact on oral pathologies, including oral cancer. The data gathered in the review may help improve the diagnosis and management of oral disease.

"The topic of the association between cancer and the microbiome, including in the oral cavity, is a very timely one," lead author Prof. Georgios Belibasakis, professor of clinical oral infection biology and head of the Division of Oral Health and Periodontology in the Department of Dental Medicine at Karolinska Institutet, told Dental Tribune International.

Discussing the most interesting findings, he commented: "There are documented associations between oral dysplastic conditions, including oral cancer, and the oral microbiome. The associations do not necessarily imply a cause–effect relationship, but there can be a vicious circle between the establishment of a dysbiotic microbiome and the progression of oral pathologies. An important aspect is that the two major components of the oral microbiome, the bacteriome and the mycobiome, tend to act synergistically in the deterioration of oral pathologies. Moreover, the tumour microenvironment, depending also on the specific type, can favour the colonisation and invasion of certain microbial species that are clinically proven to be associated with a given neoplastic condition."

The study has diagnostic and prognostic implications for oral medicine, and the researchers believe that the findings could help explain the complex interplay between bacteria and fungi in the oral cavity, thus leading to improved prevention and management of oral cancer. Additionally, Prof. Belibasakis noted that screening for alterations in the bacterial and/or fungal make-up of suspected sites could provide early indications or reveal the progression patterns of oral mucosal conditions such as oral cancer.

"Variations in the core microbiome of an individual may serve as predictive markers for any oral condition, including carcinogenesis. The available data enhances our understanding of the ecology of oral niches and their dysbiotic changes during oral mucosal dysplasia and oral cancer," he commented. "This knowledge could support early diagnostic and prognostic tools as well as innovative treatments, making a quantum leap in oral medicine," he concluded.

Editorial note: The study, titled "Bacteriome and mycobiome dysbiosis in oral mucosal dysplasia and oral cancer", was published online on 19 March 2024 in Periodontology 2000.

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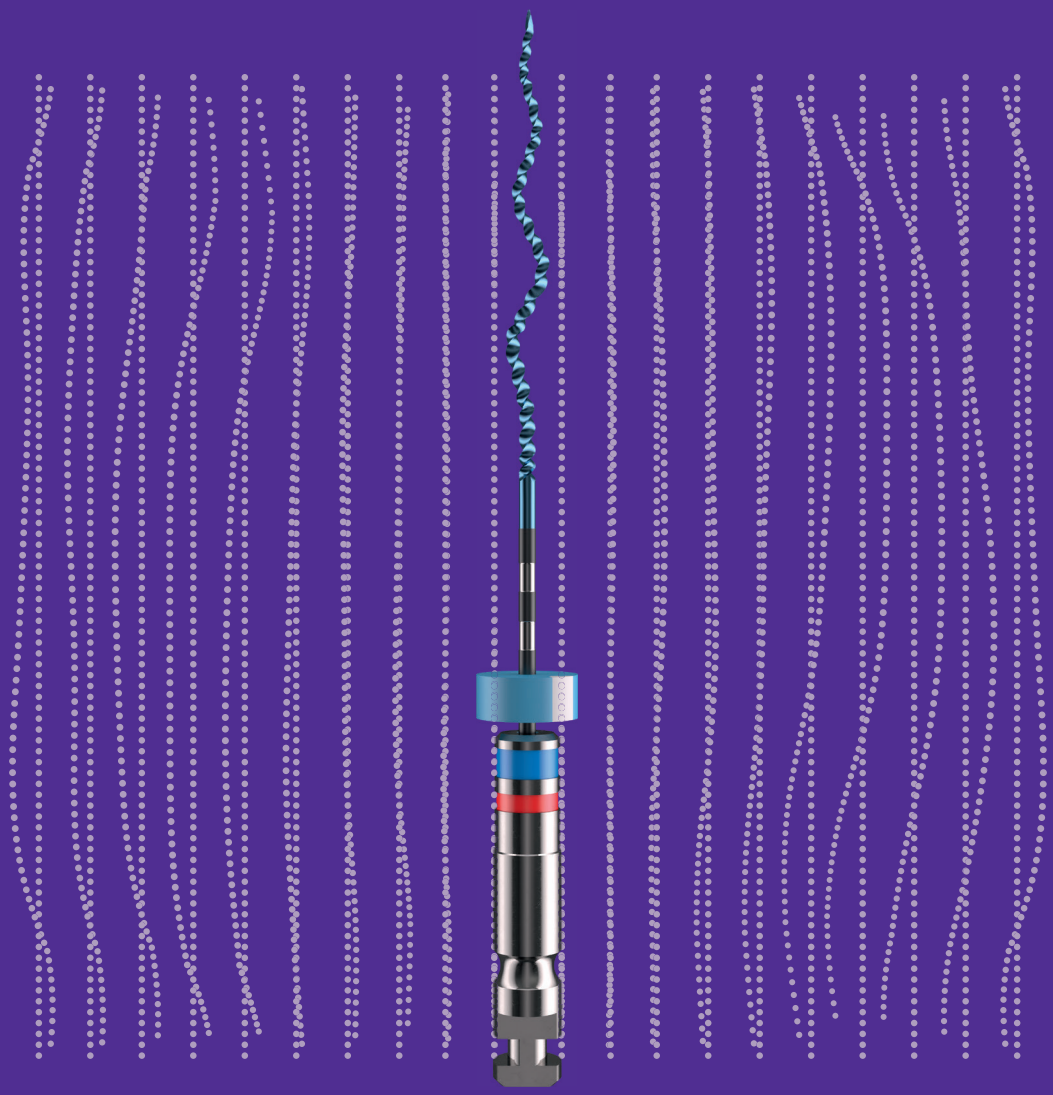

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