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# IES TIMES

Official Newsletter of Indian Endodontic Society

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### Editor's Message

## Defensive Medicine in Dentistry: An evil or prudence

Hello friends,

We the dentists are often accused for practicing defensive medicine which is nothing but based on an act of commission and omission. Commission stands for prescribing excessive amounts of medications (NSAIDs, antibiotics, etc.), investigations (2D or 3D radiographs, blood tests, etc.), and procedures during the diagnosis or planning of a patient's treatment. It has a risk of putting patients at danger especially when these investigations are invasive or employ ionizing radiation, apart from raising the cost of healthcare. Omission, on the other hand, is avoiding treatment to the medically compromised patients, who could have been benefited by the intervention, or referring them to others especially when patient's situation was critical.

The legal climate in many countries about medical errors has an impact on medical practice, and is one of the principal causes for the growth in defensive medicine. As health professionals, we are well aware that in addition to the doctor's skills, a number of additional personal and societal variables do exist that can affect the outcome of the treatment. Though the insurance market can only provide protection to the doctors against monetary damages, it can't restore the mental anguish that a doctor experiences other than the loss of reputation, which takes years to establish.

Considering the nature of work in the field of dentistry, which mostly involves surgical interventions on human bodies, justified legal protections are needed to prevent the practice of defensive medicine and to rebuild the relationship of trust between the dentist and the patients.

**Dr Vineeta Nikhil** MDS, FICD

Editor IES Times

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# Chronicles of success

## IES PG CON 2023: A Resounding Success!

The IES Times newsletter is excited to share with you the highlights of the Indian Endodontic Society National Postgraduate convention, IES PG CON 2023, which was an immense success, leaving an indelible mark on the dental community. From **3rd to 5th March 2023**, the picturesque city of Aurangabad, Maharashtra, India, served as the captivating backdrop for this grand event. Under the theme of "Excellence in Endodontics," the convention brought together more than 700 participants from various corners of the nation, including distinguished dentists and enthusiastic students, fostering a vibrant and inclusive atmosphere. The event was a shining example of excellence, showcasing state-of-the-art innovations in a lavish Dental Trade exhibition while eminent speakers from the dental industry, both domestic and abroad, sparked curiosity and knowledge in each attendee with their stirring keynote addresses.

The convention truly surpassed all expectations as it offered the first 226 lucky attendees with gratis hands-on training during the preconference session. With a comprehensive setup of 50 microscopes, the workshop provided an unparalleled opportunity for honing their magnifying abilities under the expert guidance of the esteemed "Master of Magnification Trio" - Dr. V. Gopi Krishna, Dr. Vivek Hegde, and Dr. Siju Jacob. Participants were enthralled as they delved into the microscopic world, uncovering hidden marvels that the naked eye could never perceive.

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Amidst the splendour and grandeur of the inaugural ceremony, the stage was graced by a very special guest - the indomitable Mr. Satish Kotiye. His incredible journey from a humble dental clinic assistant to a prominent figure serving the nation at its pinnacle served as a beacon of inspiration for everyone present. Mr. Kotiye's fortitude and unyielding determination in overcoming myriad challenges touched the hearts of all, leaving an indelible mark on our minds. We were honoured to have the esteemed founder president of the Indian Endodontic Society, Padmabhusan Brigadier Shri Dr. Anil Kohli, bestow his blessings upon the event. His presence and guidance orchestrated a symphony of brilliance, making the ceremony all the more memorable and impactful. Accompanying Dr. Anil Kohli on the dais were eminent dignitaries Dr. Sangeeta Talwar, Dr. V. Gopikrishna, Dr. Sanjay Miglani, and Dr. Vivek Hegde. Each of these luminaries added an aura of excellence and eminence to the proceedings. The inaugural ceremony was truly an occasion to celebrate and be inspired by the achievements and determination of exceptional individuals like Mr. Satish Kotiye and the visionary leaders in the field of endodontics.



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The event itself was a phenomenal scientific extravaganza, bringing together over 90 colleges from 19 states across India. More than 450 faculty members and students presented their scientific papers and posters, showcasing the brilliance and innovation that thrives in our academic community. The heart of the convention lay in the opulent Dental Trade exhibition. The participating exhibitors presented a diverse array of dental equipment and technology, leaving attendees awe-inspired and enlightened about the future of endodontics.

Beyond the trade exhibition, the convention hall echoed with the resonating wisdom shared by luminary speakers from the dental world. Eminent personalities, both national and international, graced the event and delivered captivating keynote addresses. Every session was packed to capacity, as no delegate wanted to miss the opportunity to hear the experts live. Dr. Filippo Cardinali from Italy, a Gold member of "Style Italiano," deliberated on the clinical necessity of premixed bioceramics sealers. Dr. Abhishek Parolia's talk centered on the importance of evidence-based periapical tissue management in clinical dentistry. Dr. Deepak Mehta engaged in a well-debated discussion on direct vs. indirect post-endodontic restorations.

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Additionally, three ENDO STALWARTS - Dr. Vivek Hedge, Dr. V. Gopi Krishna, and Dr. Siju Jacob - delved into various aspects of 'Microscope in Endodontics'. Dr. Prashant Bhasin offered his views on "The futuristic Approach to 21st-century Endodontics," discussing modern state-of-the-art equipment, instruments, and biocompatible materials. Dr. Nikhil Bahuguna and Dr. Jean Philippe Mallet shared their expertise on the use of new technologies and minimally invasive approaches in endodontics. Dr. Niranjan Vatkar emphasized the importance of using a rubber dam, and Dr. Nandini Suresh provided fresh perspectives on managing root resorption. Dr. Jojo Kottoor gave an engaging presentation on "Deep Margin Elevation: Concept and Evidence." Overall, this scientific convention was a momentous event that enriched the dental community with the latest research, techniques, and ideas in the field of Endodontics.

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The scientific sessions undoubtedly laid the foundation of knowledge exchange and advancements in the field of Endodontics. However, it was not just the academic aspects that made this event extraordinary. The Sufi and Bollywood Gala night was an absolute delight that infused the event with a blend of culture, rhythm, and harmony. It brought everyone together, breaking barriers and creating a sense of unity among all the attendees. The synergy of science, music, culture, and camaraderie that enveloped the delegates throughout the conference left an indelible mark in their hearts and minds.



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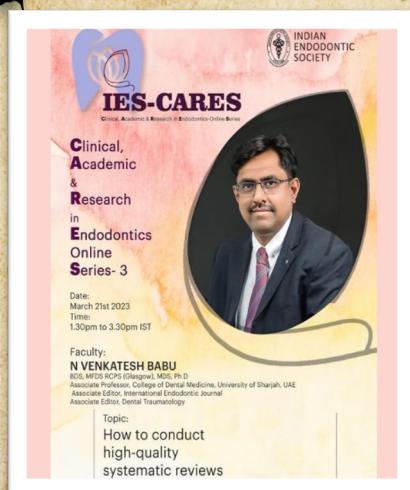




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## IES-CARES 2023



We are delighted to share with you the recent achievements of IES- CARES (Clinical –Academic-Research in Endodontic Online Series) in enhancing academic knowledge and clinical skills within the field of Endodontics. The IES-CARES was launched with a visionary approach to provide a comprehensive online repository of lectures and videos. We are pleased to announce that the first and second IES-CARES series were a resounding success.

Continuing on this path, **the third IES CARES** online lecture was conducted on **21st March 2023**. Eminent Researcher and Academician, Dr. Venkatesh Babu, led this enriching session, which saw participation from hundreds of students across the country. The lecture served as an exceptional opportunity for our members to expand their knowledge and gain insights from a distinguished expert.

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**Day 1: 27th April | 10:30-11:30**  
Speaker :  
**Dr. N. Vasudev Ballal**  
Professor  
Manipal College of Dental Sciences, Manipal  
Associate Editor, Endodontology  
**Reviewing Invitro  
and Ex-vivo research topics**

**11.30-12.30**  
Speaker :  
**Dr. Jojo Kottoor**  
Professor, Royal Dental College, Kerala  
Associate Editor, Endodontology  
**Reviewing Case reports  
and Case series**

**Day 2: 28th April | 10:30-11:30**  
Speaker :  
**Dr. Ajinkya M. Pawar**  
Assistant Professor,  
Nair Hospital Dental College, Mumbai, India  
Associate Editor, Endodontology  
**Reviewing Randomised control trials.**

**11.30-12.30**  
Speaker :  
**Dr. Nitesh Tewari**  
Additional Professor,  
Pediatric and Preventive Dentistry,  
All India Institute of Medical Sciences, New Delhi  
**Reviewing Systematic review  
and Meta analysis**

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Further, the **fourth lecture** of the **IES CARES series** was a **TWO DAY** Reviewer Training Program in collaboration with the Endodontology Journal editorial team. Held on the **27th and 28th of April**, this symposium was specially designed to offer authors and reviewers a comprehensive understanding of the assessment and review process followed by scientific journals. By equipping our members with this valuable knowledge, we aimed to enhance the quality of submissions and foster a community of proficient reviewers. The online lecture delivered by Dr. Vasudev Ballal, Dr. Jojo Kottoor, Dr. Ajinkya Pawar, and Dr. Nitesh Tewari during this event garnered high praise and appreciation from all attendees.

As a testament to IES commitment to advancing the field of Endodontics, the CARES portal is complimentary for all IES life members ensuring that IES members have unfettered access to an abundance of valuable resources to aid their professional growth.

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## A Benefit for IES Members!

As part of the ongoing efforts to enhance the value of IES membership, we are thrilled to inform you about the latest initiative by the Indian Endodontic Society that aims to further enrich your professional journey. The Indian Endodontic Society has, without a shade of doubt, made its members richer with the COMPLIMENTARY access to the Dental Trauma Guide Online Resource portal.

This evidence-based platform will undoubtedly prove to be an invaluable asset in managing traumatic injury cases within your dental practice or department. To kickstart this fantastic opportunity, a highly informative webinar was conducted on the IES CARES platform by Dr. Lars Andersson and Eva Lauridsen on **June 08th, 2023**. The webinar provided critical insights and practical guidance on effectively utilizing the Dental Trauma Guide Online Resource to handle traumatic injuries with confidence and competence. The webinar was open to all endodontists, dentists, and students, and the response was overwhelming. Attendees expressed their gratitude for the opportunity to expand their knowledge and elevate their patient care through this educational session.



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## TIME FOR QUIZZZZ.....

The Department of Conservative Dentistry & Endodontics at King George's Medical University, in collaboration with the Indian Endodontic Society, organized the 4th National Post Graduate Student Exchange Program from **27th March 2023 to 1st April 2023**. This program aimed to facilitate the exchange of knowledge and experiences among postgraduate dental students from various institutions.

During the week-long program, 29 students from 10 dental colleges participated in the exchange program. The students had the opportunity to attend clinical demonstrations done by the department faculty on various topics, including Direct Filling Gold, Laser, and Microsurgery. Additionally, academic presentations were conducted on subjects like Management of Tooth Fracture, Tips for Dental Practice, Research Methodology, Endo-Perio Relationship, Smile Design, 3D Printing, Microsurgery, and Medical Emergencies. The program also included various extracurricular activities to promote interaction and networking among the participants.

The highlight of the program was the 3rd All India National Inter Dental College Quiz Competition, which saw the participation of 31 teams from different dental colleges across India, including SAARC countries. The quiz competition took place in both online and onsite formats.

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The top position in the quiz competition was secured by the Faculty of Dental Sciences BHU, and the Runner-up position was awarded to Team Army Dental Centre, Research and Referral, New Delhi. Three Special prizes were also awarded to National Academy of Medical Sciences, Bir Hospital, Nepal, Career Post Graduate Institute of Dental Sciences and Hospital, Lucknow, and Subharti Dental College, Meerut.

It is worth noting that the Department has been organizing the National Student Exchange Program since 2017 and the National Quiz Competition since 2021. The successful execution of such events was made possible under the guidance of Professor A.P. Tikku, the Head of the Department, (Hony.) Brig. Dr. Anil Kohli, founder President of the Indian Endodontic Society, and Dr. Sanjay Miglani, President of the Indian Endodontic Society. The program aimed to foster academic growth, promote collaboration, and enhance the overall learning experience for the participating students in the field of Conservative Dentistry & Endodontics.

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## IES Collaborative Initiative: Optimizing Antibiotic Prescriptions in India's Dental Practice

IES has pridefully associated with the World Health Organisation (WHO) and CDER - AIIMS (Centre for Dental Education and Research - All India Institute of Medical Sciences) in a national initiative. The goal of this initiative is to create a comprehensive guidance document for dentists to optimize antibiotic prescriptions in India. Recognizing the significance of responsible antibiotic use in dental practice, IES has been actively involved in contributing its expertise and insights to this critical project. IES was represented by its esteemed President, Dr. Sanjay Miglani, Vice President, Dr. Ajay Logani, and Secretary General, Dr. Gopi Krishna, in the first brainstorming session held for this endeavor. By adopting evidence-based practices and promoting a standardized approach to antibiotic usage, IES aspires to ensure optimal patient care while minimizing the risk of antibiotic resistance and other potential adverse effects.



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## IES ANNUAL RESEARCH GRANT AWARD!!

We are glad to share the news that the following research projects have been selected as the winners of IES ANNUAL RESEARCH GRANT AWARD for the year 2022 with a grant money of INR 50,000/- each. Indian Endodontic Society congratulates the winners and looks forward to support meaningful endodontic research emanating from India!

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WINNERS OF THE  
ANNUAL IES RESEARCH AWARD GRANT  
2022

Study of odontogenic and osteogenic potential of Novel Pulp Capping Agent on Dental pulp stem cells : An In vitro study.

PI: **Dr. Ayesha Najam,**  
Ramiah University of Applied Sciences, Karnataka

Research Grant Awarded : INR 50,000 /-

Detection of advanced glycation end products in coronal dentin and early diagnostic changes in the calcified tissues of the oral cavity in patients with Type II diabetes mellitus by means of a chair-side technique using a novel customized handheld FT-IR.

PI: **Prof. Dr. A.R. Pradeep Kumar,**  
Thai Moogambigai Dental College and Hospital, Tamil Nadu

Research Grant Awarded : INR 50,000 /-

Salivary and GCF levels of NLRP3 inflammasome in patients diagnosed with Symptomatic Irreversible Pulpitis- A Case-Control Study

PI: **Dr. Dax Abraham,**  
Manav Riechma Dental College, Haryana

Research Grant Awarded : INR 50,000 /-

IES is glad to announce that one of its funded research “Salivary and GCF levels of NLRP3 inflammasome in patients diagnosed with symptomatic irreversible pulpitis- A case-control study” got published in Journal of Endodontics 2023.

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## Tête-à-tête with maestro



**Dr. Yoshi Terauchi**  
D.D.S., PhD.

Dr. Yoshi Terauchi, a world renowned endodontist of the CT (USA) and Micro-endodontic Center in Tokyo, Japan is also a part-time lecturer Tokyo Medical & Dental University. He has developed the Terauchi File Retrieval Kit which includes the Yoshi Loop, a revolutionary micro-lasso that allows for unparalleled access to broken files in narrow and curved canals, and modified ultrasonic tips that require minimal tooth structure removal. Let's know more about the professional and personal life of this legend.

### **Q. Can you give us an insight into your professional journey?**

I wanted to be a dentist when I was 10 years old when I saw my dentist. I wanted to have my own practice. I opened my practice two years after I got my dentist's license. Then I majored in Endodontics in my PhD program at my university (Tokyo Medical & Dental University) because Endodontics is something medical doctors really don't know. Learning Endodontics always helps patients in pain remove pain. I also wanted to do something considered challenging in Endodontics when I was younger. I wanted to manage or face difficult cases and help patients in pain save the tooth.

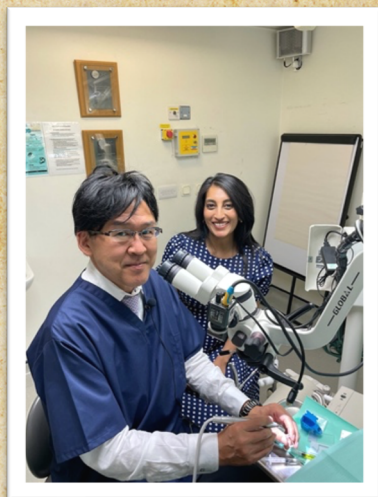
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**Q. Dr. Terauchi, you are a file removal expert par excellence. What led you to develop an interest in this field?**

I broke a # 10 K file while negotiating a canal when I was a young dentist in the University hospital. The patient was upset by what happened. But there was nothing I could do about it. After this case, I became motivated to develop a technique to remove broken files.

**Q. You are the inventor of the Terauchi File Removal Kit (TFRK). Could you explain the benefits of this kit for Endodontists? Do you have any other invention to your credit?**

With the TFRK, you will be able to remove broken files from the root canal. Everything you need for instrument retrieval is in the kit. I developed with Woodpecker "Ai motor", "812MT". There are still some others coming up from Woodpecker and other companies. I have also developed gutta-percha removal hand instruments (GPR).

**Q. You are a magician in the file retrieval arena. Can you tell us a about your experience with retrieval of broken files extruding out of the apex?**

Necessity is the mother of invention. Before I came to this level, I made several big mistakes that I will never forget. One of them is, I pushed a broken file out of the apical foramen with ultrasonics. Once you made a big mistake, you would be careful of the same mistake.

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**Q. What are your other areas of interest in Endodontics. Which are your favourite researchers who you collaborate with?**

MTA obturation, revascularization, bypassing ledged canals, gutta-percha removal, differential diagnosis are my other areas of interest in Endodontics. My favourite researchers are Dr. George Bogen and Dr. Mahmoud Torabinejad.

**Q. Your work showcases even the most complex cases handled with ease and expertise. How do you deal with the stress involved in managing such cases?**

I always consider complex cases a lot of fun rather than a pain in the neck. It is important to love whatever you are doing to be successful in it.

**Q. Your file retrieval cases have mesmerized endodontists. Can you give a few pertinent tips for clinicians aspiring to upgrade themselves in instrument retrieval?**

You need to attain three goals to be successful in instrument retrieval; get paid higher fees for the instrument retrieval procedure, to get motivated to remove the file, to make it predictable to remove the file.

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**Q. How does the complexity of the root canal system impact the design and the implementation of the instrument retrieval systems. How does the cross section of the instrument affect the instrument retrieval?**

The TFRK ultrasonic tips are designed to be minimally invasive in preparing the canal with various complexities for instrument retrieval. The cross-section size of the broken file affects the preparation time for instrument retrieval.

**Q. Do you always advocate removal of instrument? Or what are the criteria to retain or retrieve the separated instrument?**

It is not always necessary to remove every broken file you see on the radiograph. I advise that the broken file with a preoperative periapical lesion should be removed from the root canal.

**Q. How do you envision the future of instrument retrieval? Are there any potential developments or breakthroughs that you anticipate?**

I envision a short-term future of broken file removal technique will be mechanically removal using rotary files whereas a long-term future of broken file removal technique will be AI-guided mechanical removal.

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**Q. Do you have an academy for training Endodontists? What are the courses conducted in the academy?**

Yes, I do. We have many programs mainly of endodontics including Initial endodontics, Nonsurgical retreatment, Surgical endodontics, Broken file removal, Mastering challenging endodontic cases, Clinical use of operating microscope in Endodontics. Besides endodontic programs, we have an implant course and some restorative courses.

**Q. What are your hobbies and interests besides dentistry. Who has been your greatest support in your personal and professional journey?**

My hobbies include collecting sports cars, driving those cars, and travelling. I respect Prof. Mahmoud Torabinejad, Prof. George Bogen, Prof. Shimon Friedman in my personal and professional journey. But I often chat personally with Dr. Sam Kratchman, Dr. Wagih Tarek, and Dr. Mohamed Mohsen.

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## Dr. Prasanna Neelakantan

M.D.S, FHEA (UK), PhD  
Associate Professor and Director of Research  
Department of Endodontics,  
University of the Pacific,  
Arthur A. Dugoni School of Dentistry,  
California.

## Overseas Endo

### Creativity, Opportunity and Innovation

*The world is an oyster.*

We are a fortunate crowd! We are mechanical in our work and biological in the thoughts that lead to the mechanical work. We have the opportunity to create, advance the science and eventually, the practice of dentistry. Indeed, change does not happen overnight. Research takes time and effort. It is not a route for short-term success. In this “Overseas Endo” editorial, I will draw on my minimal, yet valuable experience and offer a map, a legend, and a forecast of the conditions of the path to innovation to encourage those new to it. The meaning of the word innovation can best be revealed by looking at the etymology of the word. It is derived from the mid 16th century Latin that means restoration, renewal. From radiographic diagnostics to rotary instrumentation to material science advances as well as the digital revolution (to name a few), we are all the fortunate beneficiaries.

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But what if the word “renewal” unlocks a secret that we have been programmed to be benefactors of innovation AND this is a pathway to happiness?

*“Why are we here on earth? To create! It’s in our nature.”*

Karim Rashid

Consider that each one of us embodies a process of renewal on a continual basis.; this is a powerful metaphor. About 330 billion cells are replaced daily, equivalent to about 1 % of all our cells. In 80 to 100 days, 30 trillion will have replenished—the equivalent of a new you. To create is indeed our nature, in harmony with our biologic process, and when we are generating novel and useful ideas, several investigators have found an intriguing link with happiness!

### **CREATIVITY AND HAPPINESS**

Academic excellence is not necessarily a strong predictor of career excellence (Grant 2018). The neurobiological pathways support this finding, as serotonin, noradrenalin and dopamine are released in the Amygdala when performing something creative. Creativity is generally conceptualized as the ability to create products that are original and adaptive. Nevertheless, originality alone is insufficient. To be considered creative, the output must also be applicable and useful to the problems at hand. Indeed, empirical evidence supports that both novelty and usefulness are the two key ingredients of creativity.

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*"Creativity is intelligence having fun"*

Einstein

Creative thinking, or the ability to generate new ideas for solving complex tasks, including practical and life-related issues, is among the skills required for the 21st century. Although there is a lack of agreement regarding how to define creativity, in psychology it is widely accepted that a creative idea should be both novel and useful (Simonton 2012). Different from intelligence, which usually refers to analytical skills, creativity refers to generating ideas and behaviours in new or familiar situations. Creative potential is the latent ability of an individual to create something original when given the opportunity (Lubart *et al.* 2003); this component is distinct from creative achievement, which is the potential reflected in creative behaviours and products.

#### **STEPS ON THE PATH TO INNOVATION**

Machu Picchu and Huayna Picchu are both part of the Peruvian Andes Mountain range. Machu Picchu in Peru, for over 100 years, has been called one of the most famous of the archaeological sites in the world, but the Incas that built it called it Huayna Picchu, which translates to "new peak" and is steeper. Machu Picchu means old peak and is more easily travelled. There are 5 main levels to this summit: Base camp begins with the idea which seems to have 3 prompts in the category of what I would say either epiphany, fortuity, or acuity. Next is advocacy which is to find support in the scientific and business community. Thirdly, *in vitro* research leading to patent application and filing precedes *in vivo* research in preparation for commercialization which includes clearance requirements with performance results, manufacturing protocols and biocompatibility tests. Lastly, implementation involves manufacturing, distribution and sales and contracts in place for licensing and royalties.

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### IDEATION

There appears to be 3 main tributaries to the incubation of novel discoveries. One is flashes of insight that have been reported perhaps in a slightly altered state. Second is serendipity which is a gift of finding something valuable that was unexpected. Thomas Edison was famously opposed to sleeping. In an 1889 interview published in the Scientific American, the ever-energetic inventor of the lightbulb claimed he never slept more than four hours a night. Sleep was, he thought, a waste of time. Yet, Edison may have relied on slumber to spur his creativity. The inventor is said to have napped while holding a ball in each hand, presuming that, as he fell asleep, the orbs would fall to the floor and wake him. This way he could remember the sorts of thoughts that come to us as we are nodding off, which we often do not recall.

Sleep researchers now suggest that Edison might have been on to something. A study published recently in Science Advances reports that we have a brief period of creativity and insight in the semi lucid state that occurs just as we begin to drift into sleep, a sleep phase called N1, or nonrapid-eye-movement sleep stage 1. The findings imply that if we can harness that liminal haze between sleep and wakefulness—known as a hypnagogic state—we might recall our bright ideas more easily. Thinking creatively has been shown to be enhanced by spending time at least 15 seconds in N1 or non-rapid eye movement phase. A mathematical problem with a hidden rule was solved 83% to 30% when participants were in that space as opposed to awake.

### *INTUITION: Not rational maybe?*

Intuition is not a rational power like analysis. It usually works best when the rational power is shut off for a while. It is a function of the mind that organizes sense data, disparate bits of

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knowledge, images, symbols, experiences, even random emotions, and then creates insights (and fantastic charts) out of those raw materials. Reason divides, intuition unites. Have you ever noticed that people who take vacations or retreats usually come back filled with bright new ideas? There's a reason for that. By turning off the analytical mind for a while, the intuitive mind can do its work.

#### SERENDIPITY

The Scottish physician and microbiologist Alexander Fleming had 2 experiences with serendipity. In 1921, he discovered lysozyme, an enzyme in the body fluids such as saliva and mucus, that has an antiseptic effect. When he had a cold, a drop of his mucus fell onto a culture plate of bacteria, later to find out it influenced bacterial growth. Then in 1928, he noticed a culture plate of *Staphylococcus aureus* that had been contaminated with a fungus, a mold later identified as *Penicillium notatum*, which inhibited the growth of bacteria. He first called it mold juice. It took chemists 15 years to bring it to market fortunately in time for World War II. In dentistry, it was Branemark that legendarily found that when in 1952 (30 years before introduction to NA at Toronto Conference) a costly titanium ocular chamber (a viewing mechanism for bone healing) could not be removed, he came upon a novel application...an antidote to the mandibular denture amputee!

Our group recently had incredible success with serendipity too. We recently discovered an antimicrobial peptide, which for the first time, showed remarkable antifungal properties that were not abolished by biological fluids, a feature that remains problematic for most peptides. This peptide was not amongst our original plans. A mistake in writing down one of the amino

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acids resulted in this discovery! So, the key take home message here is that, embrace the idea that mistakes can sometimes lead to substantial discoveries!

#### *DISRUPTIVE TECHNOLOGIES*

The most disruptive technology in 2023 was GPT, an AI technology that can answer just about any question you pose and engage in higher-order tasks like sorting, categorizing, and problem-solving at a rapid pace. This chat bot has been cited as one of the most disruptive innovations since the internet, with its capacity to upend how people learn, conduct research online, and interact with technology in their jobs.

Do review papers still hold scientific value as AI can practically now write our manuscripts? Only use these technologies to improve readability and language, not to replace key researcher tasks such as interpreting data or drawing scientific conclusions. Apply the technology with human oversight and control, and carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete, or biased. Disclose in their manuscript the use of AI and AI-assisted technologies in the writing process. Please note that authors are ultimately responsible and accountable for the contents of the work. Do not let AI take over NI (Natural Intelligence)!

#### *THE BIFUNCTIONALITY OF EVIDENCE: Identify the gap and unmet needs*

The literature is a traffic cop, either conferring a smooth road to successful treatment or raising a stop sign for continued passage in another direction. The evidence is also a litmus for us to distinguish between our outcomes and expected outcomes. But this brings us to an important area: what literature do we rely on? I strongly believe that both undergraduate

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students and postgraduate students MUST be taught about different avenues for publishing, as well as what constitutes the good, bad, and ugly of scientific publishing. It is important to understand different indexing systems (Scopus, PubMed, Web of Science etc.), metrics (Clarivate Analytics JCR which is the impact factor of a journal) and other metrics that different indexing bodies provide. Are these metrics robust indicators of the actual quality of a journal – this is something that is substantially conflicted upon by scientists worldwide. But, nevertheless, the impact factor is one means by which your scientific publication will likely be judged by your peers – Here, education is paramount. Educators needs to first be aware of these indexing systems and what will propel their own careers and those of their students. *This is something that just cannot be compromised.*

#### **COLLABORATION AND NETWORKING**

As clinicians, we do not have the answers to many questions. Basic scientists have many answers, but they do not necessarily know what the clinical question is. Collaborating and networking, both locally and internationally with basic scientists and clinician-scientists is the only way to perform research to the highest level of scientific rigor and advance the science, in many of the areas of dentistry where evidence is still nascent. Reach out to people! I cannot over emphasize how important this is. But how you reach out is what makes or breaks it. A random e-mail, with no introduction of yourself, what work you are trying to accomplish and why you need someone's help is critical. Remember that most scientists are busy responding to 100s of e-mails every day, teaching, working in the labs, sitting on administrative committees, performing assessments, writing research grants, having meetings with their students, or preparing for conferences. Amongst all this work, most scientists love to mentor

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junior faculty and emerging scientists. But how you structure that first ever e-mail you send out to them, makes, or breaks it.

### **SOME FINAL WORDS**

I want to use this section to speak to both the educators and the students, *with the hope that it does not sound patronizing (such is not the intention too!)*. Educators have incredible power in shaping the future of our students. They draw inspiration from us. We are their role models. We provide them with the opportunities for growth, which absolutely no compromise on the quality or rigor. Lest not forget that we are purely mentors who show them direction and help them realize their goals, which may be purely clinical or academic or an integration of both. This also needs a very open mind, one which is acceptable to change and learning.

Many students (and new faculty) flee at the sound of the word research because some systems force this. Research is motivated by passion. These emerging stars must be taught and shown what good research can bring to them. Do not play the number game. Quality trumps quantity any day. As educators, it is critical that we know and educate our students on scientific integrity, publication quality and indexing databases. Let your students network and collaborate with others – *give them the wings!*

Students, there is ample opportunity to flourish in any domain you want. The world is an oyster! Have clear goals. Plan for those goals – let nothing detract or distract you from it. Work with your mentors, reach out to other mentors (of course, with explicit permission of your on-site mentor!). Start with simple projects. Advance your scientific knowledge. Reach out when you are stuck (Yes, this is reiterated, not redundant, because this is so important!).

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Be consistent in your research. Do not do things that distract you from your goals (Do not write review papers on topics that you are not an expert in). Attend as many conferences (local and international) as possible. Make scientific presentations. Listen to talks. Network and reach out (Oops, reiterated again!). Where facilities may not be available in your institute, it is this networking that will help you accomplish your goals.

***"Find out what the world needs and invent it!"***

**Edison**



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## Dr. Krishna Vyas

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## Emerging concept in Endo

### Full coverage crown as post endodontic restoration

*We can't solve problems by using the same kind of thinking we used when we created them*  
*Albert Einstein*

Endodontic practice and its success have been inextricably tied to the nature and quality of the final restoration because when compared with teeth with healthy pulps, endodontically treated teeth are considered more susceptible to fracture.<sup>1</sup> Hence, in the past, crowning of devitalized teeth was considered a "fait accompli". Although some long-term retrospective studies have demonstrated its good reliability,<sup>2</sup> this kind of approach may be invasive.<sup>3</sup> According to Daniel Edelhoff et al 67.5% to 75.6% crown structure removal is involved in tooth preparation design for posterior teeth.<sup>4</sup> In case of failure, the invasive nature of such procedure often excludes the possibility of a re-intervention due to the poor quantity of the remaining dental tissues; in addition, it exposes the tooth to a higher risk of irreversible fractures,<sup>3</sup> questioning the "existential restorative crisis".

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Though it was believed in the past that endodontically treated teeth become more brittle and susceptible to fracture,<sup>5,6</sup> more recent studies dispute these findings. Huang et al compared the physical and mechanical properties of dentin specimen from teeth with and without endodontic treatment at different levels of hydration and concluded that it is the change in free water not the bonded one that accounts for 9% loss of moisture leading to slight decrease in Young's modulus but not compressive and tensile strengths.<sup>7</sup> Sedgley and Messer evaluated the biomechanical properties, punch shear strength, toughness, hardness, and load to fracture of endodontically treated teeth and concluded that teeth do not become more brittle following endodontic treatment.<sup>8</sup> Reeh et al compared reduction in tooth stiffness after endodontic and restorative procedures, and reported that the endodontic procedures reduced the cuspal stiffness of teeth by only 5%, in contrast to an occlusal cavity preparation (20%) and a mesio-occluso-distal (MOD) cavity preparation (63%), and stated that greater the remaining tooth structure, greater is the fracture resistance.<sup>9</sup> Thus, loss of vitality impact appears to be negligible but preexisting caries / fracture access cavity, and root canal shaping alter the biomechanical properties due to loss of structural integrity.<sup>3</sup> In addition, reduction in tooth bulk and loss of sound dentin resulting from tooth preparation causes further weakening of tooth.<sup>10</sup> Hence Many recent studies are emphasizing on preserving intact structures to optimize the biomechanical behavior and to increase the fracture resistance of the endodontically treated tooth.<sup>11-13</sup> Development of the adhesive philosophy in dentistry and the high bonding performances achieved by modern adhesive systems have gradually changed the dogma "devitalized tooth = crowned tooth" and many classical indications for a crown restoration are nowadays questioned. Modern clinical procedures to restore ETT are rather based on the principles of minimally invasive dentistry.<sup>3</sup>

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Additionally, thanks to the most exciting developments in dentistry which has emerged within the past decade is an interdisciplinary biomaterial science called biomimetics. This concept of research involves the investigation of the structure and physical function of biologic “composites” and the design of new and improved substitutes and techniques. The ultimate goal is to mimic the biomechanics, structural and aesthetic integrity of the original tooth by the restoration.<sup>14</sup>

***I Want to know God's thoughts...the rest are details***

*Albert Einstein*

Intact Tooth is designed to absorb compressive and tension loads as a total biomechanical entity. Enamel acts as a stress distributor, transferring the load vertically to the root, and horizontally via the dentino-enamel junction (DEJ) to the dentin of the crown. Dentino-enamel Complex/ Junction has a critical role in keeping the tooth intact and in distribution of the stresses.<sup>15</sup> DEJ provides a crack-arresting barrier by resisting the tensile stresses and prevents the catastrophic tooth fractures. Discontinuity of this due to cavity disrupts the natural load distribution.<sup>16</sup> Hence Biomimetic Restorative concept is designed to connect the tooth with materials having similar modulus of elasticity as that of tooth components, so as to mimic an intact tooth in micromovements and function. Biomimetic restorative protocols help in achieving 50 MPa micro tensile bond strengths similar to that of DEJ,<sup>17</sup> and incorporation of fiber ribbons help in increased composite resin toughness, thus increasing both durability and damage tolerance.<sup>18</sup> The structure of the fiber based on multidirectional yarns creates a great multitude of load paths that redistributes the occlusal forces throughout

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a greater region of dental restorative composite and prevents stress concentration.<sup>18</sup> The fibers tight adaptation to tooth structure allows a dramatic decrease of the composite volume between the tooth structure and the fiber, thus protecting the residual weakened walls from both the stress from polymerization shrinkage and the occlusal load.<sup>18</sup> The higher modulus of elasticity and lower flexural modulus of fiber have a modifying effect on the interfacial stresses developed along the cavity walls with a character of "Fail safe mechanism" i.e. prevention of catastrophic fractures by diluting and redirecting the crack propagation to a restorable fracture.<sup>1</sup> Ample of studies showed fracture resistance of endodontically treated molars restored with fiber incorporation was superior in comparison with restorations without fiber.<sup>1,19,20,21</sup> Hence with today's available materials and techniques, preservation of sound tooth structure and mimicking the performance characteristics of an intact healthy tooth is possible with Biomimetic restorations.

If we understand DEJ closely, it is more scalloped in the occlusal portion of the molars and is almost flat in the cervical region, which could be one of the reasons why the stress concentration is more in the cervical 3rd, which is in agreement with many studies.<sup>16</sup> Hence there is a need to preserve Peri cervical dentin (PCD) during endodontic procedure and prefer conservative post endodontic treatment option to preserve the cervical crown structure. Compression Dome concept<sup>22,23</sup> is another important concept which has formed the basis to conserve the crown structure in the cervical region. This concept is based on Biomechanics and Biomimetics. A tooth is essentially a compression dome, with the enamel being in compression on top of the underlying dentin. In the top of the compression dome i.e., in the Bio Dome the stress is compressive, and then it changes over into tension, as we come down



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towards the walls of the crown i.e., in the Bio Rim region. So, the goal is to recreate the lost compression dome and protect the underlying dentin from tensile forces. But by preparing the tooth for full crown, we violate the Bio Rim and put the tooth under lot of tension forces. Hence according to compression Dome concept, restrict the preparation to Bio Dome to recreate the occlusal structures to withstand the compression like an intact healthy tooth and avoid tension in underlying dentin by preventing tooth preparation for a full crown. Based on the concept of the compression dome and an understanding of force distributions, a badly damaged tooth can be restored with an adhesive overlay. By keeping a restoration in the coronal half of the tooth, it is not exposed to radial hoop stress that occurs in the bottom half of a compression dome. Our restorative materials and teeth all cope best in compressive environments, so it makes sense to try and keep restorations out of areas exposed to significant tensile forces. In the emerging field of Biomimetic Dentistry, several techniques were developed based on these principles of working with Mother Nature's design. These restorations are so effective because they are bonded to the tooth with modern bonding systems that are now in the range of 40-50MPa of tensile strength, which is similar to Mother Nature's tensile bond between enamel and dentin which has been measured at 45MPa.<sup>22,23</sup>

For Decades though the Full coverage crown is being considered as a "***fait accompli***" for endodontically treated posterior teeth, the advances in material science and techniques allow us predictable minimal invasive post endodontic treatment modalities to preserve the remaining tooth structure, thus having more options for the tooth of concern, if need arises in future. This in turn helps in long term functional survival of endodontically treated tooth. And today we are witnessing more than 2 decades of such successful minimal invasive treatment modalities. However, the functional longevity of endodontically treated tooth depends on many restorative factors including case selection, position of the tooth, remaining tooth structure, loads, periodontal condition and how meticulously the protocols are

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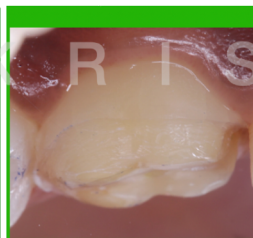


followed in the procedure starting from analysis of occlusion to isolation to final verticalization of occlusion. Hence thorough knowledge and training prior to attempting such procedures is recommended to minimize the failures and to deliver predictable long-term results.

### Partial Coverage Indirect Post Endodontic Restorations with Follow ups



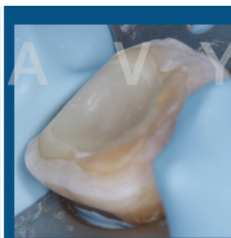
5 yrs follow up



5 yrs follow up



4 1/2 yrs follow up



4 1/2 yrs follow up



4 yrs follow up



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## Stress Reduced Direct Composite Post Endodontic Restorations with Follow ups



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### Full coverage crown as post endodontic restoration

Restoring endodontically treated tooth (ETT) is an essential part of the complete treatment plan and making the right choice is a challenge. The main intention of restoring an ETT is to seal the orifice to prevent secondary infection and to prevent fracture of the tooth mainly due to cusp deflection.<sup>1</sup> Contrary to the earlier claims that ETT is brittle and weak due to the endodontic treatment, the ability of an ETT to withstand the occlusal forces without fracturing depends on the remaining tooth structure. Most often there is structural loss, especially the marginal ridge due to caries, restoration or access preparation,<sup>2</sup> which requires immediate post endodontic restoration treatment to protect the weak cusps.

In the past, the trend was to completely cover the ETT with full coverage restorations, which stripped the teeth of enamel and dentin to eliminate the undercuts. Today with advancements in adhesive dentistry, restoration of ETT has undergone a paradigm shift. Contemporary Dentistry focusses on minimal invasive dentistry, conserving tooth structure

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and restoring lost tooth structure in a way to mimic the natural teeth in form, function and esthetics.

The choice of post endodontic restoration is dependent on many factors like the structural loss or amount of healthy enamel present, the location of the tooth and the magnitude of masticatory load, undercuts in the tooth, knowledge and skill of the clinician.<sup>3,4</sup> The restoration should mimic the natural tooth not only in aesthetics, but also in function and main parameters are the modulus of elasticity and surface hardness. Lithium Di silicate (LDS) closely matches the surface hardness and modulus of elasticity of enamel (Enamel SH-2-7GPa, ME-72-80 GPa V/s LDS- SH-6GPa, ME-60-95 GPa).

**In case of anterior teeth:**

1. If the tooth is intact and not discolored, the lingual access can be restored with Composite resin.
2. When the tooth is intact and discolored, internal bleaching is done to improve the value followed by composite resin to seal the access opening.
3. A small angular fracture can be restored with resin while the larger fractures will need Ceramic Veneer. Composite veneers do not match the stiffness of enamel.
4. When the remaining tooth structure is compromised (less than 50% of the tooth structure) a post or fiber reinforced core is done followed by full coverage LDS crown.
5. It is advisable to avoid placing full crowns in lower anteriors because the anatomical structure dictates more tooth removal to eliminate proximal undercuts. Ceramic veneers are the best option when the structure is compromised.



In the case of posterior teeth, intact marginal ridges play an important role in preventing cuspal deflection and hence every attempt should be made protect the marginal ridge during access preparation.

1. When the marginal ridges are intact and the cusp thickness is more than 2.5mm, the access cavity can be restored with conventional resin using oblique incremental technique or bulk fill composites. When the cusps are undermined, fiber reinforcement followed by resin restoration is recommended.

2. When one marginal ridge is lost with cusp thickness more than 2.5mm, resin restoration is recommended. However, if there is an undermined weak cusp, an indirect adhesive restoration, preferably LDS covering the weak cusp is recommended which is more like an inlay.

3. When both marginal ridges are lost in an ETT, it is advisable to cover all the cusps with a ceramic onlay. Studies have shown that cusp deflection increases when the depth of the restoration is beyond 5mm, like in an access opening. When we cover the cusps, the key influencing factor for long term functional retention is the thickness of the enamel collar that helps in adhesion. This collar is thickest above the height of contour. It is advisable to place the margins at this level which will not only make it accessible to finish, but it will also avoid unnecessary removal of tooth structure especially in teeth with undercuts. When the caries extends deep into the gingival tissues, Deep Margin Elevation is the best choice over which the indirect restorations can be bonded.

The advantages of adhesive onlays over the full contour crowns are:

- Full coverage restorations necessitate the complete removal of enamel, while onlay preparations conserve enamel which is the key to longevity of the tooth.

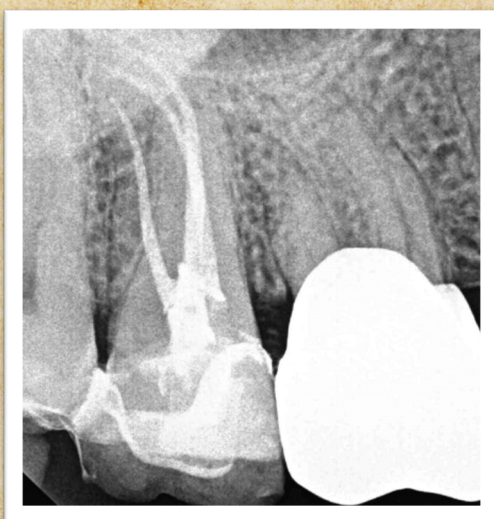




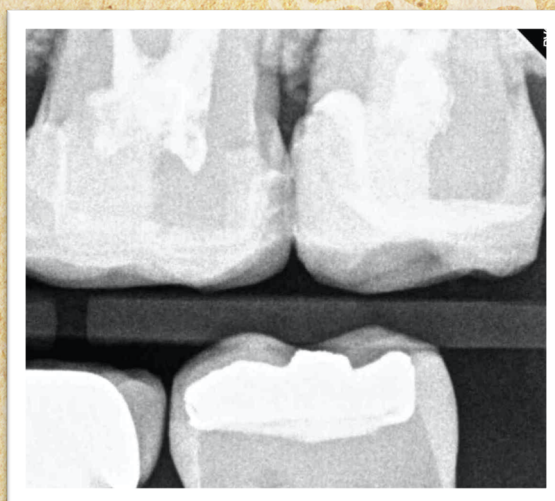
Most often we see undercuts on the lingual aspects of mandibular molars. These undercuts have to be removed for full crowns to obtain good path of insertion, which resulted in structural loss. This undercut need not be removed in case of onlays.

- Since the onlays are bonded, the micro leakage along the margins can be eliminated unlike those seen with full coverage restorations that cannot be bonded (gold, zirconia or metal ceramic crowns).
  - Since the LDS based restorations are not completely radio-opaque, secondary loss of tooth structure under the restoration can be appreciated in the radiograph unlike the metal or Zirconia crowns.
  - Another advantage is that adhesive onlays do not depend on mechanical retention (the vertical height of the remaining tooth structure) as they are bonded. Hence it is the best option in short teeth (second molars) as the retention of the prosthesis can be obtained with good adhesive strategies.
4. In case of loss of more than 2 cusps, internal support can be obtained from the root canal to retain the core. Pericervical dentin (2mm below the alveolar crest and 2 mm above the alveolar crest) plays an integral part in preventing vertical fractures. We should ensure that the dentin removal is minimal in this area and hence avoid using large, stiff orifice openers during canal preparation. Core can be retained using an adhesive post or fibers. Whatever is the choice, it should fit into the space obtained by removal of gutta percha using a heated plugger and cleaned with a No 2 or 3 gates gladden drill at slow speed. Avoid using post drills which remove pericervical dentin.

Studies have shown that extraction of ETT is due to poorly designed restorations.<sup>6</sup> So, it is highly recommended to practice minimally invasive adhesive dentistry by preserving enamel and taking full advantage of the strong bond it creates with lithium di silicate restorations, resulting in long term survival of the endodontically treated tooth.



**Ceramic Onlay on 17**



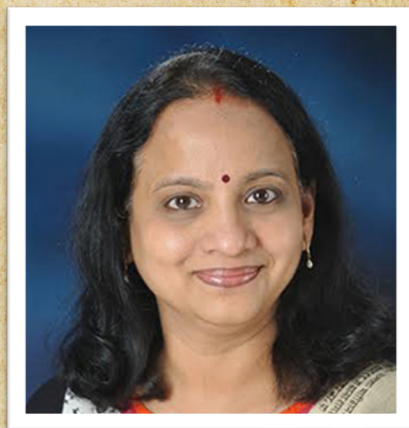
**Ceramic Inlay on 26 and 27**

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## **Full coverage crown as post endodontic restoration**

For many decades, endodontically treated teeth (ETT) were restored with full coverage crowns as a rule. 'No crown, no endo' was the dictum. Full coverage indirect restorations, specifically porcelain fused to metal and metal free crowns have a long and proven track record in the earlier part of the 20<sup>th</sup> century. And with adhesive dentistry still being in its nascent stage, direct composite restoration was not a good option for the restorative management of ETT. However, with advances in materials and technics associated with adhesive technology, and incorporation of minimal invasive procedures, there has been a paradigm shift in restoration of vital and endodontically treated teeth. In a randomized controlled trial, metal-ceramic crowns demonstrated better success rate compared to composite resin direct restorations, but with no difference in survival rates of both.<sup>1</sup> Dentin preservation is of paramount importance, during restorative procedures.<sup>2</sup> Hence the current trend is to restore ETT with direct composite restorations reinforced with suitable inserts, indirect inlays, onlays or overlays without involving the peri-cervical girth of the tooth.

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Whether it is a direct composite restoration or indirect partial or full coverage restorations, restorative management of ETT is always challenging, due to the various factors that need to be taken into consideration. These include volumetric loss of tooth structure due to caries, access cavity and root canal preparations, crack propagations and the effects of various chemicals used during root canal procedures.<sup>2,3</sup> Though the loss of moisture of pulpless root dentin is minimal and does not contribute to the reduced fracture resistance of ETT, the above factors do contribute to substantial reduction in its fracture resistance.<sup>4</sup> Hence, it is imperative that the choice of the post endodontic restoration be done before the start of the endodontic procedure.

*'It is always better to begin with the end in mind'*

According to the AAE guidelines for restoration of ETT, the following factors need to be taken into consideration<sup>5</sup>:

- Amount of remaining tooth structure
- Length, width, and curvature of the roots
- Occlusal function
- Opposing dentition
- Position of tooth in the arch

Based on Peroz et al's categorization of remaining walls of ETT from class I to V (all to none remaining walls respectively), the restorations may range from direct simple to indirect full coverage restorations.<sup>6</sup> Unfortunately, the above classification does not take into consideration the radicular remaining dentin thickness. Further, clinicians often encounter root canal treatment in teeth that have extensive loss of coronal tooth structure, with most walls missing. It then becomes imperative to opt for a full coverage crown in such cases with inadequate ferrule and axial walls.



We need to keep in mind that for effective bonding to occur with indirect restorations, presence of adequate enamel margins is mandatory, since optimal bonding to dentin is secondary at the best. More so with dentin of ETT that has been subjected to various clinical procedures not excluding access cavity preparation, exposure to various irrigants, intracanal medicaments, root canal sealers, temperature changes during obturation, etc.<sup>7</sup> A restorative dentist essentially should understand the types of forces acting on the ETT in order to take the appropriate decision of whether to use a post or not, whether to crown or not.<sup>8</sup> Ideally, an enamel peripheral rim is preferred for bonding of indirect restorations to the substrate.<sup>9</sup> Babacar Touré et al analysed the reasons for extraction of ETT. They found that of the 119 ETT, only seven teeth (5.9%) had crowns.<sup>10</sup> In a similar study, Zadik et al found 85% of the ETT were without full cuspal coverage.<sup>11</sup> A systematic review by Stavropoulou and Koidis showed a 10-year survival rate of 81% for crowned ETTs and 63% for ETTs with direct restorations.<sup>12</sup> Mandibular molars are the teeth subjected to maximal stresses within the oral cavity, and of all the reasons for extraction of ETT, mandibular molars without crowns were found to be the teeth that were deemed for extraction.<sup>10</sup>

Though the use of full coverage crowns has reduced over the past decade, it cannot be totally taken away from the restorative options, since this is the only option for teeth with all missing walls and inadequate axial height, with compromised substrate for bonding.

*'Old is gold, and gold is beautiful'*; porcelain fused to metal (read gold alloy) crowns have a long duration of clinical durability and can still serve dentistry for years to come.

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## Up to the minute



### **Dr. Paromita Mazumdar**

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## **Digital Health: Transforming Healthcare in the Digital Era**

Digital health has emerged as a pivotal force in transforming the healthcare landscape, revolutionizing the way healthcare services are delivered and accessed. This rapidly evolving field encompasses the use of digital technologies, such as electronic health records (EHRs), telemedicine, mobile health (mHealth) applications, wearable devices, and artificial intelligence (AI), to enhance patient care, improve healthcare outcomes, and streamline healthcare operations.

Digital dentistry has emerged as a game-changer in the field of dentistry, revolutionizing the way dental care is provided and received. This innovative approach incorporates various digital technologies, including computer-aided design and computer-aided manufacturing (CAD/CAM), intraoral scanners, 3D printing, and virtual reality (VR), to enhance diagnosis, treatment planning,

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### **BENEFITS OF DIGITAL HEALTHCARE**

Digital health offers numerous advantages that contribute to improved patient outcomes and enhanced healthcare delivery. Firstly, electronic health records (EHRs) have facilitated the seamless sharing of patient information across healthcare providers, enabling efficient and coordinated care. Moreover, telemedicine and mHealth applications have revolutionized access to healthcare, especially for remote and underserved populations, by providing virtual consultations, remote monitoring, and health education. Additionally, wearable devices and AI-driven analytics have empowered individuals to take charge of their health, promoting preventive care and personalized interventions.

### **CHALLENGES IN IMPLEMENTING DIGITAL HEALTH**

Despite its vast potential, the adoption and implementation of digital health solutions face various challenges. Privacy and security concerns surrounding patient data are critical considerations that need to be addressed to maintain patient trust and confidentiality. Interoperability issues among different digital health systems pose barriers to seamless data exchange and collaboration. Furthermore, the digital divide, including limited internet access and technological literacy, presents challenges in ensuring equitable access to digital health technologies, particularly for vulnerable populations.

### **APPLICATIONS OF DIGITAL DENTISTRY**

Digital dentistry finds application in various aspects of dental practice, ranging from diagnosis to treatment and patient education. For instance, intraoral scanners capture accurate digital impressions, which are then used to design and fabricate restorations through CAD/CAM systems. This eliminates the need for traditional manual labor-intensive processes and reduces the turnaround time for prosthetic restorations. 3D printing technology allows for the fabrication of surgical guides, orthodontic aligners, and

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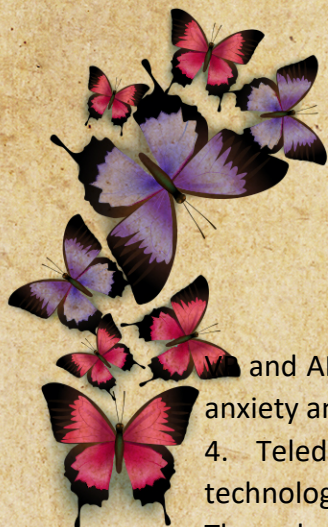
even custom implants, facilitating precise and personalized treatment outcomes. Virtual reality (VR) is increasingly being utilized for patient education and treatment planning, allowing patients to visualize their treatment journey and make informed decisions.

#### **NOTABLE EXAMPLES IN DIGITAL DENTISTRY**

Several notable examples showcase the transformative power of digital dentistry. One such example is the use of chairside CAD/CAM systems, such as CEREC (Chairside Economical Restoration of Esthetic Ceramics), which enable the same-day fabrication of dental restorations, eliminating the need for temporary restorations and multiple appointments. Another example is the application of 3D printing in orthodontics, where customized aligners are fabricated based on digital models, providing a more comfortable and efficient alternative to traditional braces. Additionally, guided implant surgery using digital technology ensures precise implant placement and optimal aesthetic

#### **The applications of digital health in dentistry may be elaborated as:**

1. **Digital Imaging:** Digital imaging techniques, such as intraoral cameras and cone beam computed tomography (CBCT), provide detailed and accurate images of the oral structures. These images aid in diagnosis, treatment planning, and monitoring of dental conditions, including caries, periodontal disease, and dental anomalies.
2. **Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM):** CAD/CAM technology allows for the precise design and fabrication of dental restorations, such as crowns, bridges, and veneers. Digital impressions obtained through intraoral scanners eliminate the need for traditional messy impressions, leading to improved patient comfort and accuracy. CAD/CAM systems enable the production of restorations in a single visit, reducing chair time and enhancing patient convenience.
3. **Virtual Reality (VR) and Augmented Reality (AR):** VR and AR technologies have been incorporated into dental practice for treatment planning, patient education, and anxiety management. Patients can visualize their treatment outcomes and participate in interactive educational experiences, making informed decisions about their oral health.



VR and AR also help in distraction techniques during dental procedures, reducing dental anxiety and enhancing patient comfort.

4. **Teledentistry:** Teledentistry involves the use of digital communication and telehealth technologies to remotely provide dental consultations, assessments, and follow-ups. Through secure video conferencing, dentists can evaluate oral conditions, provide guidance, and offer oral health advice to patients who cannot physically visit the dental clinic. Teledentistry improves access to dental care, particularly for underserved populations, rural areas, and individuals with mobility challenges.

5. **Mobile Health (mHealth) Applications:** mHealth applications in dentistry provide a platform for patient education, oral hygiene reminders, and personalized treatment information. These applications can include features such as oral health trackers, brushing timers, and appointment reminders, promoting better oral health practices and adherence to treatment plans.

6. **Digital Patient Records and Practice Management:** Digital health technologies facilitate the transition from paper-based patient records to electronic health records (EHRs). EHRs store patient information securely, enabling easy access, sharing, and updating of dental records. Practice management software streamlines administrative tasks, appointment scheduling, billing, and inventory management, improving the efficiency of dental practices.

7. The integration of digital technologies continues to advance the field of dentistry, enhancing oral health services and transforming the way dental care is delivered.

#### **FUTURE PROSPECTS**

The future of digital health holds immense promise for transforming healthcare further. Advancements in AI and machine learning algorithms are expected to revolutionize disease diagnosis, predictive analytics, and treatment optimization. The integration of genomics and personalized medicine with digital health technologies will enable tailored interventions based on an individual's genetic profile. Internet of Medical Things (IoMT)



...ll connect various medical devices and wearables, enabling real-time monitoring and data-driven healthcare interventions. As digital health evolves, it will continue to enhance patient care, improve healthcare efficiency, and drive innovations in healthcare delivery.

### CONCLUSION

Digital health is a rapidly expanding field that has revolutionized healthcare delivery, providing numerous benefits such as improved access to care, enhanced patient outcomes, and personalized interventions. However, challenges related to privacy, security, interoperability, and equitable access need to be addressed for widespread adoption and optimal utilization of digital health technologies. With ongoing advancements in technology and increased collaboration between healthcare and technology sectors, digital health holds immense potential to shape the future of healthcare, enabling more efficient, accessible, and patient-centered care.

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## Teaching-Learning



### **Dr. Shalini Aggarwal**

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### **Microteaching in Dentistry**

The specialty of Conservative Dentistry & Endodontics is considered one that hones and develops both art and science. Most of us, having acquired the necessary skills strike out into practicing the profession, some of us both practice and teach and a lesser percentage of us opt to become pure academicians.

Some of us are natural-born teachers and take to the profession like ducks to water, but some of us do struggle. At times we are unaware of the impact we are having with our teaching – good or bad! Most of our teaching in the initial phase is a hit or miss, and if there is no willing mentor to coach us through this phase, we shall certainly do more harm than good. Though this state of affairs should be no surprise, given that nothing in our undergraduate or postgraduate courses prepares us for the teaching profession. Unlike the dental programs, it

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It might come as a surprise for most of you to know that the Indian Nursing Council has made provision for teacher training in its syllabus both at the levels of BSc and MSc.

The DCI has dictated that the students pursuing the MDS program take a minimum of 2 lectures every year of their program, which amounts to a measly 6 hours of teaching spread out over 3 years. As one can imagine this comes nowhere near what is required to “teach teaching.” This can be easily rectified though by the incorporation of microteaching in our MDS programs and also for the youngsters who join the teaching profession, immediately upon passing. Microteaching sessions when conducted correctly, help the candidate to first “unlearn and then relearn” the salient features of education. And given the strides that education has been taking it is safe to say that even the veterans would benefit by undergoing this process and in turn be more effective teachers.

Though, an underutilized tool, microteaching is a familiar term to most of us and can be put into place effectively. Let us divide the process into a few basic steps.

**Step -1:** This step is to establish the **outcomes of the teaching** to be done. In this, the mentor and the mentee should identify the target audience, as in undergraduate, postgraduate, or even the laterals like the assistants and nursing staff. Further, the **topic should be decided** with a few basic parameters in mind – is it too big or too small for the decided period of teaching, which is generally an hour. **Take-home messages** should be incorporated into the lecture. Provision should be made for a **basic assessment** at the end, which can be any mode as befits the topic chosen. Google Forms generally work well. To establish the assessment method, the teacher needs to understand what is the desired outcome of the teaching. So then arises the question, is the desired outcome in the domain of knowledge, skills, or attitude? Once the domain is identified the take-home messages can be created and

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distributed throughout to enhance the purpose of that learning period. It needs to be kept in mind at all times, that we are doing adult teaching.

**Step -2:** This step is for the mentee, and the mentor should impart coaching about communication skills and the avoidance of repetitive phrases and hand gestures. In addition, the audio-visual aid, which is generally a Powerpoint presentation should be examined for mistakes (most commonly are spelling mistakes). Then a mutual decision should be made about **the snapshot** that will be used in the microteaching session. This is the area that presents a common stumbling block for most of us. The snapshot is just like the name indicates; it only covers a part of the teaching to be done. This step has generally been misconstrued and the trainees are made to condense the lecture, instead, the mentor should help in the selection of 5 to 10 slides from the original presentation, which must necessarily include a flow chart for the entire lecture, a take-home message and the method of assessment planned.

**Step -3:** The audience for the microteaching session has to be meticulously selected. It should comprise of a **teacher from the same subject, a peer of the examinee, i.e – if a postgraduate student is being examined, another student should be there, or if an assistant professor is being examined, a similarly ranked colleague should be present.** To the mix should be added a teacher of another subject. For the best possible assessment, a teaching faculty member of another discipline like nursing or physiotherapy, should join the assessing team. Doing this shall give a fair assessment of the overall teaching. The subject expert will be able to assess the content and its appropriateness in terms of the teaching topic, whereas the others will be able to give an unbiased view of the teaching ability in terms of communication skills, clarity,



and effectiveness of teaching. A project in this aspect is already in progress by us and to date has given very good results.

Following these basic precepts, would, I am sure, elevate the quality of teaching in our discipline and help to bring us into the newer era of teaching, keeping physical teaching relevant, whilst at the same time incorporating new-fangled gadgetry and technology into our day-to-day teaching.

**My take-home messages here thus would be:**

- 1- “You must unlearn what you have learned”. As says the learned Yoda. (This is a genuine quote, look it up if you do not believe me! 😊)
- 2- Obliterate the stigma that comes with being examined late in life, in other words, no matter what our seniority we would be well-served by undergoing a microteaching session ourselves. I am saying this with experience, in my department, professors too have undergone this rigorous assessment.
- 3- Use a standardized checklist for evaluation. Make the exercise count, do not just tick boxes, for as Yoda says - “No! Try not. Do. Or do not. There is no try.”
- 4- Be kind to your mentees, remember we never taught them how to teach. Share your own experience and enrich their teaching.

Happy Learning and teaching.



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## Beyond the borders of the pulp chamber



**Dr. Yohan Chacko**

B.D.S., M.D.S.

Dr. Yohan Chacko, a multifaceted dentist with a zest for life, is a prime example of someone who thrives on a diverse range of extracurricular activities beyond being an astute clinician. He is Professor and HOD at Asan Memorial Dental College & Hospital, Tamil Nadu. His expansive range of hobbies and interests showcases his passion for exploration, creativity, and physical fitness. This is but a peek into his life which hopes to serve as an inspiration to our fraternity.

Dr. Yohan demonstrates his dramatic flair through his involvement in local theatre productions. As a member of The Madras Players - the oldest amateur theatre group in India for the past ten years he has had over 100 stage appearances in roles ranging from historical kings to modern day sleuths. He has also had stints with short films, advertisements as well as full length feature films. He is totally committed to this art form and finds time after

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practice hours to refine his acting skills, express his creativity, and connect with the local community.

Driven by his passion for cinema, Dr. Yohan Chacko actively lends his voice for dubbing projects. His vocal talents, combined with his linguistic skills, have enabled him to provide accurate and emotive dubbing for various films and TV serials as well as audiobooks for Audible.

Dubbed as a fitness fiend, Yohan regularly participates in long distance running events and triathlons. He also manages to mix in racquet sports like badminton and squash along with his pursuit of long distance brevets on his bicycle.

His thirst for adventure drives him to engage in various exhilarating activities as well. From bungy-jumping to kite-surfing or high altitude trekking, he seeks out opportunities that push his boundaries and offer adrenaline-pumping experiences. From the more thrilling to the sedate, he also is part of one of India's oldest sailing clubs, the Royal Madras Yacht Club where he enjoys the solace and adventure of the open waters.

COVID saw him take a completely new hobby- carpentry and his free time was well utilised in making storage units for his clinic and home. Drone technology has captured his fascination as well, leading him to explore the world of aerial photography and videography. And if all this wasn't enough music remains his major stress buster. Going back to the crossroads after 12th standard boards, his mother told him "Let dentistry be your bread and butter and music be your jam". He has played with many bands in Chennai, performed countless shows and has Youtube hits that have garnered more than 2 million views.

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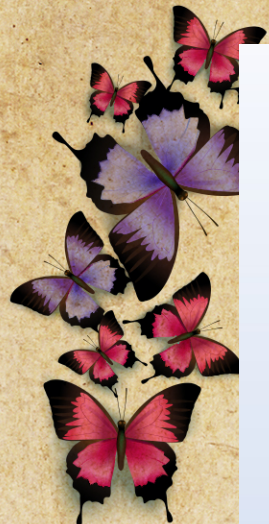
Dr. Yohan Chacko's extra-curricular activities reflect his dynamic personality and commitment to well-rounded personal growth. His dedication to these pursuits not only enhances his own life but also serves as an inspiration to others, demonstrating the importance of pursuing diverse passions alongside professional commitments.

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***The multifaceted...Dr. Yohan Chacko***



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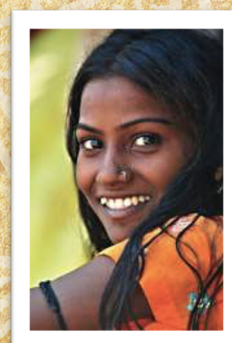


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## Being a woman

.....one birth!.. two lives!!



Squeaky voice as a little toddler  
Clinging to her mom's shoulder  
Born with innate inquisitiveness  
Bonding and warming up to her girly togetherness  
She seemed so unstoppable  
Was all pervading and capable  
Walls of her room still echo her chatters  
That "extra portion" of that yummy food was always hers  
Aimless running like lightning and endless giggles  
Oh! Did I dream, they've gone like bubbles

**Dr. V. Susila Anand**

M.D.S., PhD.

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**What next?**

The screenshot shows the website for the 14th IFEA World Endodontic Congress. At the top left is the IFEAWEC logo with the text 'WORLD ENDODONTIC CONGRESS GLASGOW / 11-14 SEPT 2024 Phases & Interfaces'. A navigation menu includes 'HOME', 'WELCOME', 'PROGRAMME', 'SPEAKERS', 'SPONSORSHIP', 'CONFERENCE INFORMATION', and 'CONTACT US'. The main banner features a landscape image of hills under a cloudy sky. The text '14TH IFEA WORLD ENDODONTIC CONGRESS' is centered. Below this, a dark blue bar contains the text 'SAVE THE DATE' followed by a date breakdown: '11-14' (DATE), '09' (MONTH), '24' (YEAR), and 'SEC, GLASGOW SCOTLAND'.

This biennial World Congress of the International Federation of Endodontic Associations (IFEA) will be organized in 2024 by The British Endodontic Society (BES) with Glasgow, Scotland, as the host city. The Conference will take place over three days, Thursday to Saturday, with a day on Wednesday for pre-congress activities. The venue will be the Scottish Event Campus, a modern multi-purpose event centre, close to the city next to the River Clyde. For more details log onto- [WEC2024@in-conference.org.uk](mailto:WEC2024@in-conference.org.uk)

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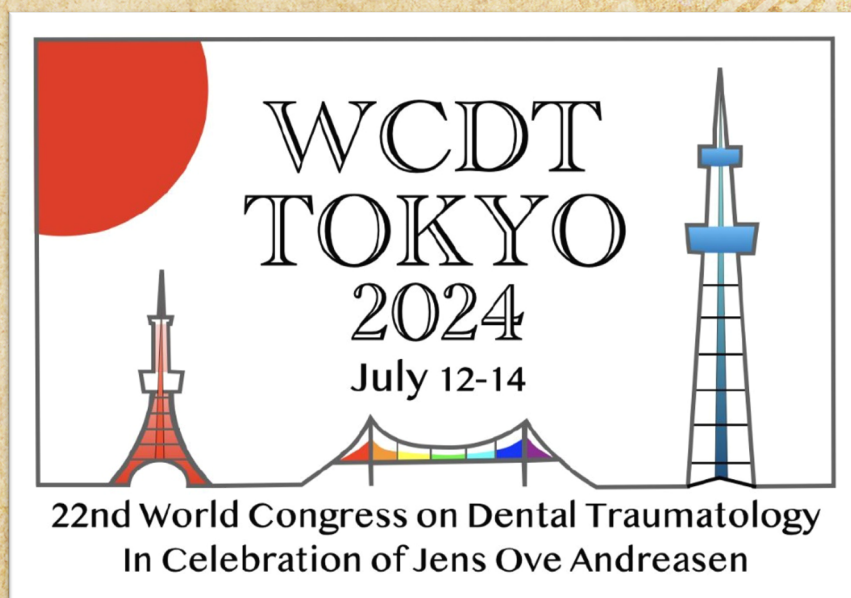
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The 8th Trans-Tasman Endodontic Conference (TTEC) to be held on the 30 May – 1 June 2024 at The Star Event Centre, Gold Coast, Australia. TTEC is held biennially and is the largest endodontic conference in Australia and New Zealand. The event is jointly organized by the Australian Society of Endodontology (ASE) and the New Zealand Society of Endodontics (NZSE).



The 22<sup>nd</sup> Congress on Dental Traumatology is being held in Tokyo on July 12-14.<sup>th</sup>  
For more details log onto <https://www.iadt-dentaltrauma.org/meetings.html>

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## ENDO MIND BENDER

### TRUE or FALSE

1. Symptomatic apical periodontitis can be found in association with a vital pulp as well as a necrotic pulp.
2. "Father of Biomimetic Dentistry" is Dr. Hillary Alleman.
3. A function of Nasmyth's membrane is to protect the enamel of teeth from the resorptive activity of the adjacent vascular tissue prior to the eruption of the crown portion of the tooth.
4. It is possible for a root canal to be underfilled without being under-extended.
5. Immediate dentin sealing may improve the bond strength of indirect restorations.

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## FILL-UP

1. The sudden disappearance of a canal on a pre-operative radiograph is called as \_\_\_\_\_ phenomena?
2. X-guide, ImplaNavig, and DENACAM are examples of \_\_\_\_\_ system.
3. A single cone obturation technique using bioceramic sealers that allows a 3D fill of the root canal along with the lateral canals is the \_\_\_\_\_ technique.
4. Chicago technique is another name for \_\_\_\_\_ obturation.
5. The Greater curve standard “Banana bands” have a width of \_\_\_\_\_.
6. \_\_\_\_\_ is a new class of synthetic AMP (Anti-microbial peptide) which exists as a star-shaped polypeptide nanoparticle.
7. The most widespread image segmentation architecture that has shown increased usage in dentistry for tooth image segmentation \_\_\_\_\_
8. \_\_\_\_\_ is a smartphone application that enables at-home detection of caries in children.
9. Guided endodontics technique was first described by \_\_\_\_\_.
10. Endodontic records must be preserved for at least a legal period of \_\_\_\_\_ years

Key (True/False): 1. True, 2. False (Pascal Magne), 3. True, 4. True, 5. True  
Key (Fill-up) Fast break phenomena, Dynamic navigation system, Hot modified technique,  
Sectional, 6 mm, Structurally Nanoengineered Antimicrobial Peptide Polymers (SNAPPs),  
U-net, AlCarries, Krastl, 6.

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## The Debutante

### Tri Auto ZX2+ Cordless Endo Motor with Apex Locator (J Morita)



Tri Auto ZX Endo motor has long been there in the dental market delivering efficient support to rotary file systems. The new Tri Auto ZX2+ is equipped with a reciprocating drive, Optimum Glide Path 2 (OGP2), that greatly reduces the chance of a file breaking in the canal. This innovative motor can be used for patency, glide path, and shaping. Its intelligent motion reduces file binding and, when it does occur, helps prevent the file from breaking in the canal. Optimum Torque Reverse (OTR) mode which was also present in Tri Auto ZX Endo motor, now also supports reciprocation files in addition to rotary files. The other features of Apical Slow Down and the integrated apex locator (Root ZX) are similar to the previous Tri Auto ZX. The Apical Slow Down reduces the rotation speed of even the reciprocating file as it approaches the apex. This function allows to provide treatment that simulates the feel of hand filing while also reducing the chance of file breakage. This new upgradation looks promising in reducing file breakage.

<https://www.jmoritaeurope.de>

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## BioRoot Flow (Septodont)



Sealers are an integral part of root canal obturation and a lot of bioactive materials have been introduced in this arena. One such material recently launched by Septodont is BioRoot Flow. It has a patented 'Active Biosilicate Technology' containing tricalcium silicate, propylene glycol, povidone, calcium carbonate, AEROSIL, zirconium oxide, acrylamide / sodium acryloyldimethyltaurate copolymer, isohexadecane, polysorbate. It is biocompatible, has bioactive properties, an alkaline pH and is easy to remove if retreatment is indicated.

<https://www.septodontusa.com/product/endodontics-bioroot-flow/>

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## iVac Apical Negative Pressure Irrigation and Activation System:



Irrigation and thorough disinfection of the root canal system are the cornerstones of successful endodontics. With the introduction of apical negative pressure irrigation in 2007, the irrigants could reach the apical one third of the canals, providing better disinfection without the risk of extrusion of the irrigant into the periapical tissues. The iVac system, launched in 2023 in addition to apical negative pressure and concomitant irrigation has also ultrasonic vibration incorporated into the system. According to the inventor, Carlos Spironelli Ramos, this system is safe, efficient and cost effective as it combines the following 3 concepts in a single device: The first concept is ultrasonic vibration, which due to the transient cavitation and microstreaming effects, helps the irrigant reach in difficult access areas in the root canal system. The second concept is the negative pressure, by which the irrigation fluid moves from the pulp chamber to the apical limit without extruding beyond the foramen. The third concept is concomitant irrigation, a principle whereby the volume of irrigating liquid is renewed continuously.

<https://pac-dent.com/products/ivac>

Ramos CS. Compendium of Continuing Education in Dentistry 2023 Volume 44, Issue 4

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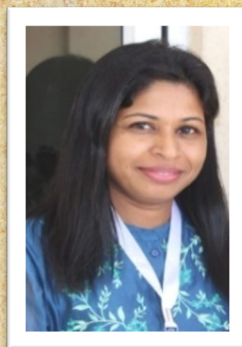
## EDITORIAL TEAM

*"No one can whistle a symphony. It takes a whole orchestra to play it."*

*- H.E. Luccock*



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