Vol 4: Issue 2: 2025

INDIAN ENDODONTIC SOCIETY

IES TIMES

Official Newsletter of Indian Endodontic Society

INDIAN ENDODONTIC SOCIETY

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Editor's Message

A Grateful Goodbye and a Hopeful Look Ahead

As I write this editorial, my last as the Editor of *IES Times*, I am filled with a deep sense of gratitude and reflection. For the past four years, it has been both an honour and a privilege to serve the Indian Endodontic Society in this capacity. What began as a responsibility entrusted to me soon turned into a journey of learning, growth, and connection with so many of you.

During this period, *IES Times* has continued to evolve as a platform that brings together the collective voices of our fraternity. From highlighting academic achievements and clinical innovations to celebrating the accomplishments of our members, the newsletter has strived to reflect the dynamism and excellence of the Indian Endodontic Society. Each issue has been a testament to the passion, commitment, and brilliance that define our community.

This journey would not have been possible without the constant support and encouragement of the IES leadership, the editorial board, and the many contributors who enriched these pages with their work. To every author who submitted an article, every member who shared an update, and every reader who looked forward to the newsletter, I extend my heartfelt thanks. You have been the true strength behind *IES Times*.

On a personal note, these four years have been immensely rewarding. The role of an editor demands precision, patience, and perseverance, but it also brings with it the joy of discovering ideas, nurturing voices, and building bridges within the profession. I step down having gained not only experiences but also friendships and memories that I will cherish always.

As I pass on this responsibility, I am confident that *IES Times* will continue to grow under new stewardship. The future of the newsletter is bright, and I believe it will scale even greater heights, keeping pace with the ever-expanding horizons of endodontics.

Though this is my last editorial as Editor, it is not a farewell to *IES Times* or to the IES family. I remain committed to the cause of our specialty and will continue to be an active part of this inspiring community, albeit in a different role.

With gratitude in my heart and hope for the future, I bid farewell to this chapter and look forward to witnessing the continued journey of *IES Times*.

JaiHind
Dr Vineeta Nikhil MDS, FICD

President's Address

கற்றது கைமண் அளவு, கல்லாதது உலகளவு

"What we have learned is a mere handful; what we haven't learned is the size of the world."
— Thirukkural

Dear Esteemed Members,

It is a privilege to address you through this edition of the **IES Times**. This timeless verse reminds us of the vast ocean of knowledge that lies ahead — a principle that beautifully aligns with our journey in Endodontics.

Over the past year, the Indian Endodontic Society has grown stronger through academic pursuits, collaborative efforts, and the enthusiasm of young professionals. I extend heartfelt thanks to every member for your contributions in enriching our specialty.

In this era of rapid technological advancements, it is more important than ever to remain rooted in evidence-based practice while embracing innovation. Let us continue to pursue excellence, not only in clinical practice but also in teaching, research, and mentorship. The future of Endodontics lies in how well we train and inspire the next generation.

I also warmly invite you to **IESCON 2025**, to be held in **Goa from 31st October to 2nd November**. With an exceptional scientific program and the charm of Goa, the conference promises an ideal blend of learning and camaraderie.

Let us continue to advance together, grounded in ethics, innovation, and the spirit of lifelong learning.

Warm regards,
Dr. M. R. Srinivasan
President

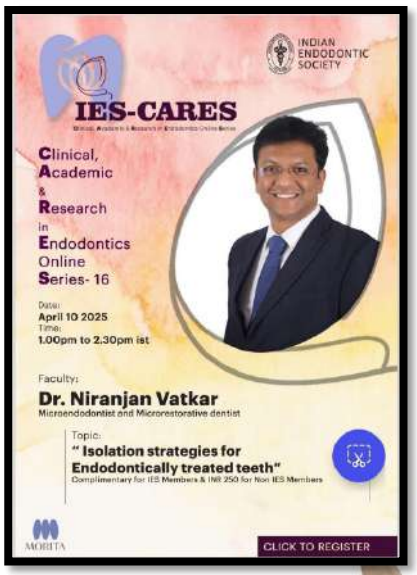
Chronicles of Success

IES CARES: Continuing the Journey of Learning and Innovation !!

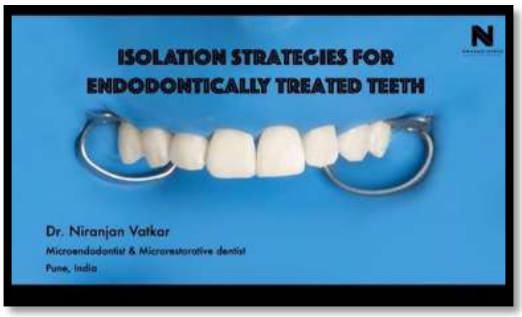
The Indian Endodontic Society's IES CARES (Clinical, Academic & Research in Endodontics Online Series) continues to provide a platform for knowledge sharing, clinical insights, and professional growth. Each session features distinguished speakers who bring contemporary perspectives and evidence-based expertise to the endodontic community.

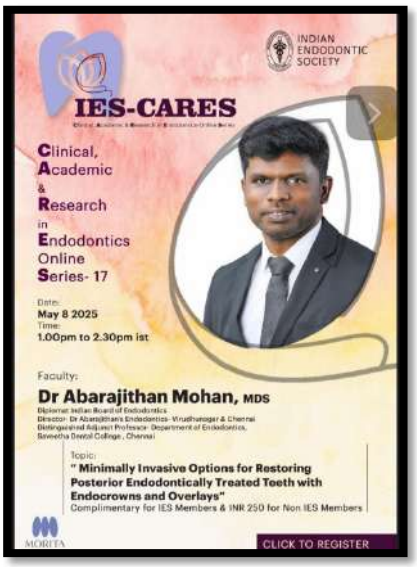
IES CARES 16

On 10th April 2025, the Indian Endodontic Society hosted an enlightening lecture by **Dr. Niranjan Vatkar**, a distinguished Microendodontist and Microrestorative Dentist. The topic of the lecture was *"Isolation Strategies for Endodontically Treated Teeth"*, focusing on the importance of effective isolation techniques in achieving successful and long-lasting outcomes.



Dr. Vatkar emphasized the role of proper isolation in preventing contamination, enhancing visibility, and improving overall treatment quality. He discussed the use of rubber dams, specialized clamps, and magnification as essential tools in clinical practice. Additionally, he addressed common challenges such as managing compromised tooth structure and maintaining a dry field, offering practical solutions and clinical tips for improved procedural efficiency.

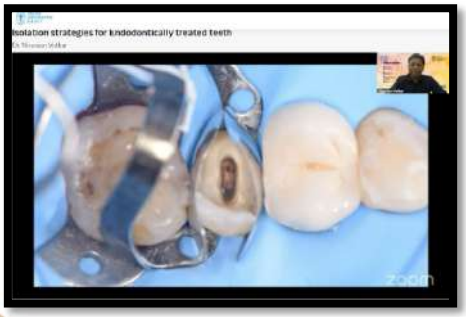


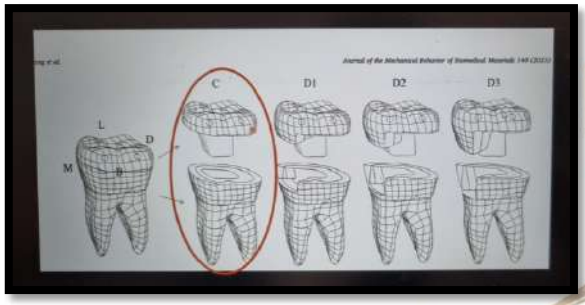


IES CARES 17

The Indian Endodontic Society conducted a thought-provoking lecture by **Dr. Abarajithan Mohan, MDS**, Professor, Department of Endodontics, Saveetha Dental College, Chennai. The topic, *"Minimally Invasive Options for Restoring Posterior Endodontically Treated Teeth with Endocrowns and Overlays,"* focused on modern restorative approaches that prioritize tooth preservation.

Dr. Mohan explained how endocrowns and overlays serve as efficient and conservative solutions for restoring structurally compromised posterior teeth. He emphasized their role in maintaining tooth integrity, reducing the need for aggressive preparation, and enhancing clinical longevity. The session offered practical guidelines for material selection, case planning, and bonding protocols, making it highly relevant to contemporary dental practice.





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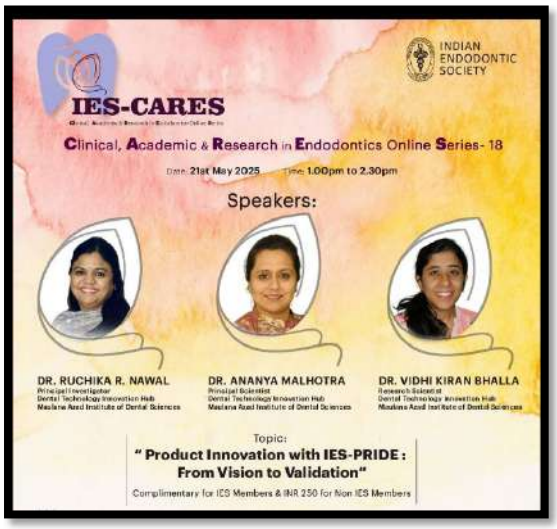
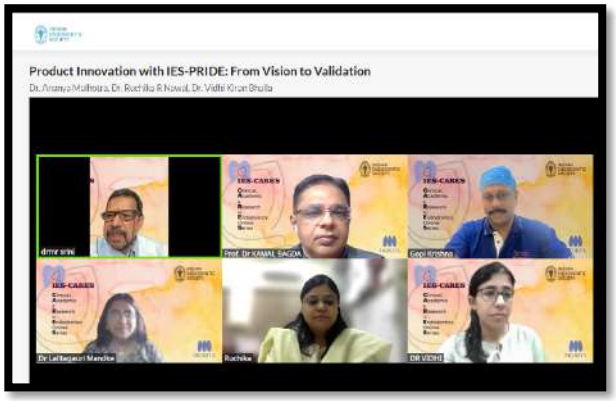
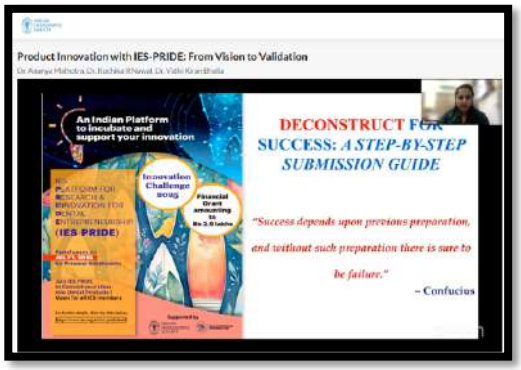


On 21st May 2025, Dr. Ruchika R. Nawal, Dr. Ananya Malhotra, and Dr. Vidhi Kiran Bhalla (Dental Technology Innovation Hub, MAIDS) delivered a session on ***"Product Innovation with IES-PRIDE: From Vision to Validation."***

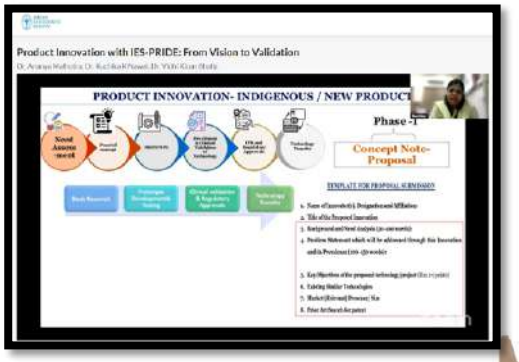
The session focused on the **IES-PRIDE framework**, which stands for *Innovation, Engineering, and Strategy through Product Research, Ideation, Development, and Evaluation*. The speakers highlighted how this structured model enables the transformation of innovative ideas into validated, market-ready products. They also shared real-world case studies and emphasized the importance of user feedback, agile development, and cross-functional collaboration in driving successful product innovation.




Product Innovation with IES-PRIDE: From Vision to Validation
An Indian Platform to incubate and support your innovation
Innovation Challenge 2025
Financial Grant amounting to Rs 3.0 lakhs
(IES PRIDE)
DECONSTRUCT FOR SUCCESS: A STEP-BY-STEP SUBMISSION GUIDE
"Success depends upon previous preparation, and without such preparation there is sure to be failure."
– Confucius

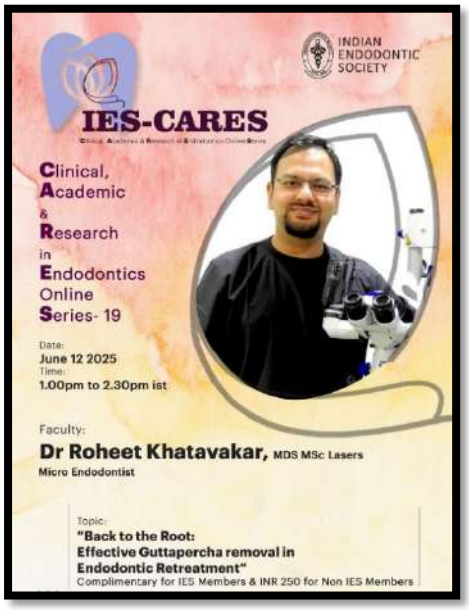

Product Innovation with IES-PRIDE: From Vision to Validation
IES PRIDE INNOVATION CHALLENGE -2024
INDIAN ENDODONTIC SOCIETY
IES-PRIDE
INNOVATION CHALLENGE 2024
HOW TO APPLY?

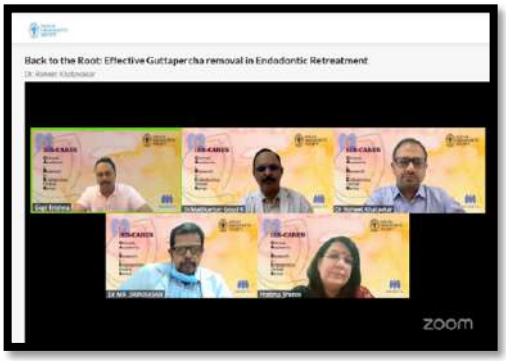

Product Innovation with IES-PRIDE: From Vision to Validation
CHALLENGES IN PATENT PROCESS
Lack of awareness about IP Rights
Loss of Novelty By Publication Prior To Patent Filing Process
Complexity Of Patent Drafting
Funding Challenge
PATENT
CHALLENGES
PATENTnitra

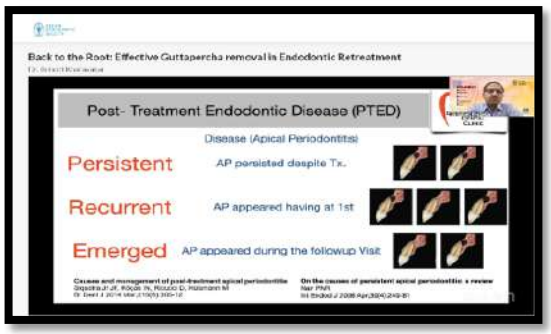

Product Innovation with IES-PRIDE: From Vision to Validation
PRODUCT INNOVATION- INDIGENOUS / NEW PRODUCT
Phase -1
Concept Note-Proposal
TEMPLATE FOR PROPOSAL SUBMISSION

IES CARES 19

On 12th June 2025, the Indian Endodontic Society hosted an engaging session by **Dr. Roheet Khatavakar, MDS, MSc (Lasers)**, a renowned Micro Endodontist. He delivered a presentation on *"Back to the Root: Effective Guttapercha Removal in Endodontic Retreatment."* The session highlighted advanced techniques and clinical strategies for efficient guttapercha removal during retreatment procedures. Dr. Khatavakar emphasized the role of modern instruments in enhancing treatment outcomes while preserving tooth structure.

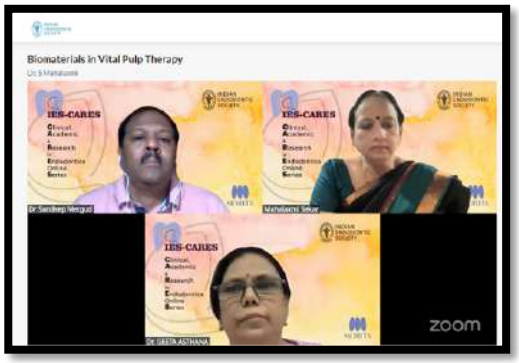




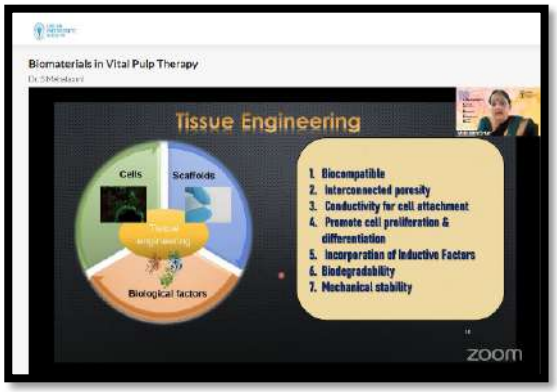


IES CARES 20

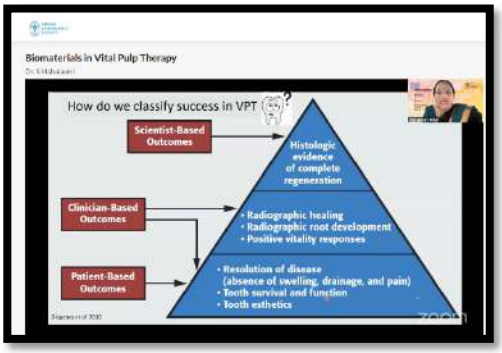
On 9th July 2025, the IES conducted an enlightening session featuring **Dr. S. Mahalaxmi**, Professor and Head, Department of Conservative Dentistry and Endodontics, SRM Dental College, Ramapuram, Chennai. She delivered a lecture on *"Biomaterials in Vital Pulp Therapy,"* highlighting the pivotal role of biocompatible materials in preserving pulp vitality and enhancing regenerative outcomes. The session provided valuable insights into the selection, clinical application, and biological behaviour of contemporary biomaterials. Her presentation emphasized evidence-based approaches to achieving successful and predictable outcomes in vital pulp therapy.


Biomaterials in Vital Pulp Therapy
IES-CARES
zoom


Biomaterials in Vital Pulp Therapy
WHY VPT?
Histopathology of Deep Carious Lesions
Histology of Carriously Exposed Pulp
Healing Potential of Inflamed Pulp
zoom

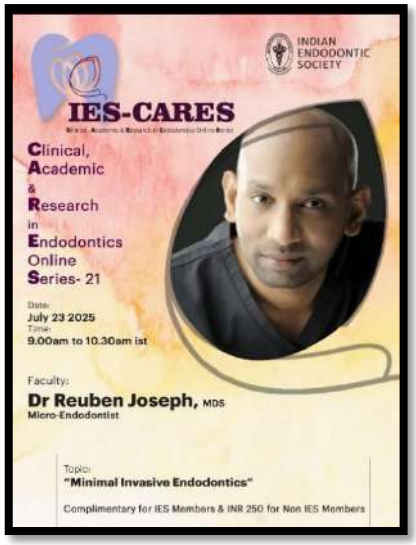

Biomaterials in Vital Pulp Therapy
Tissue Engineering
Cells
Scaffolds
Biological factors
1. Biocompatible
2. Interconnected porosity
3. Conductivity for cell attachment
4. Promote cell proliferation & differentiation
5. Incorporation of Inductive Factors
6. Biodegradability
7. Mechanical stability
zoom


Biomaterials in Vital Pulp Therapy
ESE Position Statement on VPT
zoom

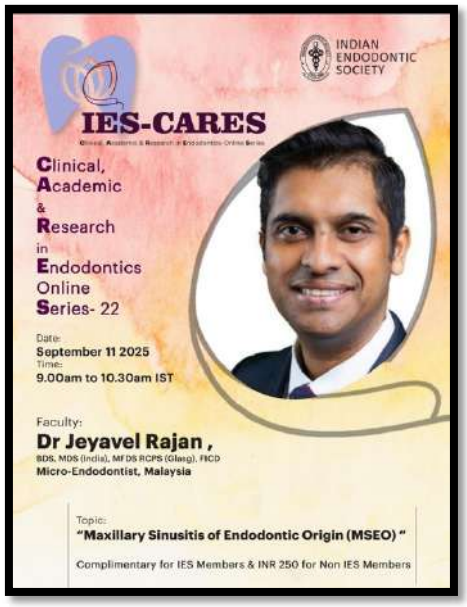

Biomaterials in Vital Pulp Therapy
How do we classify success in VPT
Scientist-Based Outcomes
Histologic evidence of complete regeneration
Clinician-Based Outcomes
• Radiographic healing
• Radiographic root development
• Positive vitality responses
Patient-Based Outcomes
• Resolution of disease (absence of swelling, drainage, and pain)
• Tooth survival and function
• Tooth esthetics

IES CARES 21

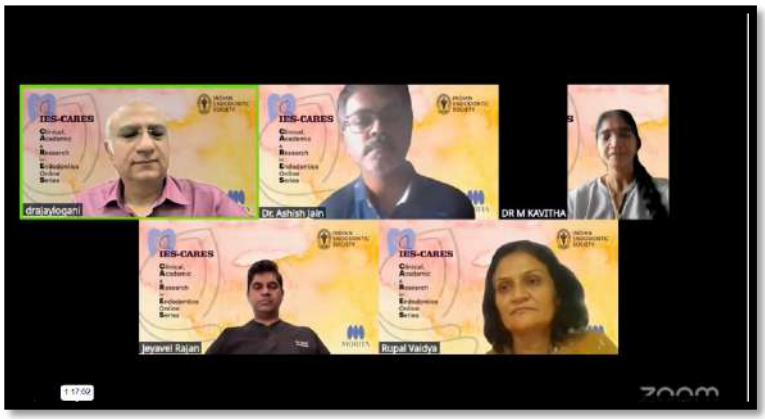
On 23rd July 2025, **Dr. Reuben Joseph, MDS**, Micro-Endodontist, delivered an engaging presentation titled *"Minimally Invasive Endodontics."* The lecture highlighted the importance of preserving tooth structure while ensuring effective treatment outcomes—an essential principle in modern endodontic practice. The clarity of the presentation and its strong clinical relevance made the session both engaging and enriching, offering practical knowledge applicable to daily practice.

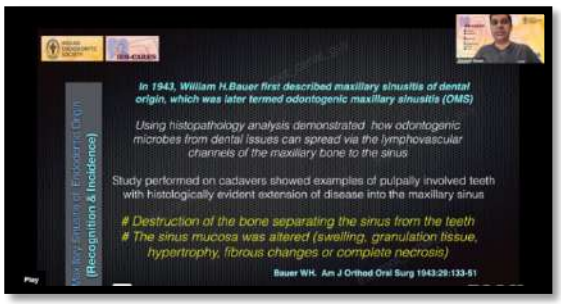


IES CARES 22

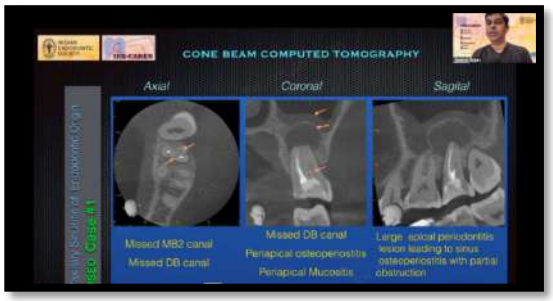


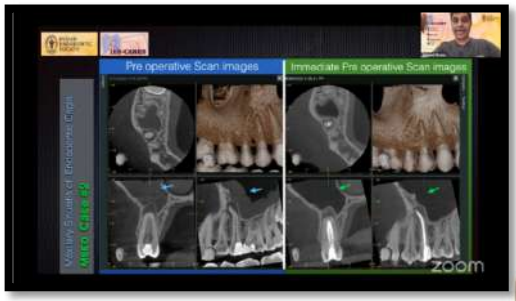
On 11th September 2025, the Indian Endodontic Society hosted an engaging IES CARES event featuring **Dr. Jeyavel Rajan**, Micro-Endodontist from Malaysia. He delivered a compelling presentation titled *"Maxillary Sinusitis of Endodontic Origin (MSEO)."* The session provided an excellent understanding of the intricate relationship between endodontic pathology and sinus health. It highlighted diagnostic challenges, clinical presentations, and evidence-based management strategies for MSEO, effectively bridging the gap between endodontics and otolaryngology. This highly informative and clinically relevant lecture enriched participants' knowledge and emphasized the importance of interdisciplinary collaboration in patient care.


IES-CARES
drajayfogani
Dr. Ashish Jain
DR M KAVITHA
Jeyavel Rajan
Rupal Vaidya
zoom


In 1943, William H.Bauer first described maxillary sinusitis of dental origin, which was later termed odontogenic maxillary sinusitis (OMS)
Using histopathology analysis demonstrated how odontogenic microbes from dental issues can spread via the lymphovascular channels of the maxillary bone to the sinus
Study performed on cadavers showed examples of pulpally involved teeth with histologically evident extension of disease into the maxillary sinus
Destruction of the bone separating the sinus from the teeth
The sinus mucosa was altered (swelling, granulation tissue, hypertrophy, fibrous changes or complete necrosis)
Bauer WH. Am J Orthod Oral Surg 1943;29:133-51


zoom


CONE BEAM COMPUTED TOMOGRAPHY
Axial
Coronal
Sagital
Missed MB2 canal
Missed DB canal
Missed DB canal
Periapical osteoperiostitis
Periapical Mucositis
Large apical periodontitis lesion leading to sinus osteoperiostitis with partial obstruction


Pre operative Scan images
Immediate Pre operative Scan images
zoom

CDE Showcase: "Apex to Anatomy" at Subharti Dental College, Meerut

A Continuing Dental Education (CDE) program titled ***"Apex to Anatomy"*** was organized by the Department of Conservative Dentistry & Endodontics, Subharti Dental College, Meerut, in association with the Indian Endodontic Society on **4th September 2025**.

The chief guest for the event was **Dr. Ajay Logani, President-Elect, Indian Endodontic Society**. The program was also graced by several dignitaries, including **Prof. (Dr.) Pramod Kumar Sharma, Vice Chancellor, Swami Vivekanand Subharti University; Dr. Nikhil Srivastava, Principal, Subharti Dental College & Hospital; Dr. Sanjay Miglani, Past President, Indian Endodontic Society; Dr. Irfan Ansari, EC Member, IES**, along with Deans, Heads of Departments, faculty members, and **132 postgraduate students from 15 dental colleges across four states**.

The inaugural ceremony was followed by a **welcome address by the Organizing Chairperson, Dr. Vineeta Nikhil**, and then by a series of academic and clinical sessions including lectures, demonstrations, hands-on training, and an esthetic case competition. The **first guest lecture** was delivered by **Dr. Ajay Logani** on the topic *"Tip to Taper: What is Ideal in Root Canal Preparation"*, where he emphasized the significance of efficient shaping and cleaning of root canals to enhance treatment success and patient comfort. The **second guest lecture**, delivered by **Dr. Sachindeep Singh**, was titled *"Restorative Extravaganza: Direct Composite Masterclass"*. He highlighted the use of the layering technique with composites to achieve superior esthetic outcomes.

This was followed by a **live demonstration** on composite esthetic restorations using layering technique by **Dr. Sachindeep Singh**, and a **hands-on workshop** on anterior composite restoration, in which **25 delegates actively participated**. The session provided valuable tips and clinical strategies to maximize success in both endodontic and restorative procedures.

In addition, **35 postgraduate students participated** in the **esthetic case competition**, showcasing their clinical skills and creativity. At the **valedictory function**, prizes and certificates were awarded to the winners: **1st Prize** – Dr. Anshika Saxena; **2nd Prize** – Dr. Dipansha Sharma; **3rd Prize** – Dr. Iti Gupta, and **Consolation Prizes** – Dr. Ridhiman Raman & Dr. Shefali Singh.

The event was a resounding success, providing an excellent academic platform for knowledge sharing and skill enhancement in the field of Conservative Dentistry and Endodontics.

Tête-à-tête with maestro

Dr. Anil Kohli

B.D.S; M.D.S; DNB

Padma Bhusan, Padma Shri

Dr. Soni's Dental Clinic, New Delhi

We are privileged to feature an exclusive interview with Dr. Anil Kohli, a stalwart in the field of dentistry and an inspiration for generations of professionals. His visionary leadership, pioneering contributions, and dedication to advancing dental education and practice continue to shape the future of our profession. In this candid conversation, Dr. Kohli shares his experiences, insights, and words of wisdom for young dentists and academicians.

Q. Dr. Kohli, you have been a guiding light in Indian dentistry for over four decades. What inspired you to pursue dentistry, and more specifically, endodontics?

When I was young, like many in my generation, the natural choice for a bright student was medicine. But dentistry fascinated me because it allowed me to combine science with art- the precision of medicine with the aesthetics of restoring smiles. I saw dentistry not just as treating disease, but as giving people back their confidence, dignity, and quality of life.

As I progressed, I was drawn to **endodontics**, Why? Because saving a natural tooth is one of the most gratifying things a dentist can do. Orthodontics reshapes smiles beautifully, but endodontics gives immediate relief- it takes away a patient's pain and preserves what nature has given. There's a unique satisfaction in transforming a patient's agony into gratitude in just one sitting.

Dentistry gave me the chance to heal, to innovate, and to serve- and endodontics became my calling because it is at the heart of preserving natural teeth, which to me is the essence of true dentistry.

So when I chose dentistry, it wasn't just about a career. It became a purpose. Every time a patient left my clinic smiling, pain-free, and more confident, I knew I had made the right choice. And that sense of fulfilment has kept me passionate for decades.

Q. Who were your mentors in your student or early professional life and which advise played a pivotal role in shaping your career path?

I have been fortunate to have had remarkable mentors during my student and early professional years who shaped not just my career, but my outlook on life. As a young dental

student, I looked up to my teacher Prof. T.N Chawla who instilled in me the importance of discipline, precision, and compassion in clinical practice. His guidance taught me that dentistry is not merely about technical skill, but about empathy and responsibility towards patients.

Every great journey has a beginning, and mine began under the guidance of legendary figure in Indian dentistry- **Padma Bhushan Dr. M.L Soni.** As a young dentist, I had the privilege to work in his shadow, to observe not just his mastery of the craft, but his values- discipline, humility, and the unwavering belief that dentistry is about service to humanity.

Dr. Soni taught me that dentistry is far more than treating teeth- it is about restoring dignity, confidence, and the very essence of life for our patients. Those lessons shaped me, and they became the foundation of everything I have done in my career.

If today I stand here as an icon of dentistry, it is because once stood as a student in the presence of a giant. His legacy continues through the countless lives he touched, and I am proud to carry forward that light, hoping to inspire the next generation of dentists just as he inspired me.

Q. Your tenure as the President of the Dental Council of India and your contributions to policy-making have been ground-breaking. What were some of the most significant challenges you faced, and how did you overcome them?

During my tenure as President of the Dental Council of India, one of my priorities was to ensure that dentistry in India kept pace with global standards. For that, I made **Continuing Medical Education (CME)** and **scientific publications** mandatory. Why? Because dentistry is constantly evolving- new materials, new technologies, new approaches to patient care. A

dentist who stops learning falls behind. By mandating CME, we created a culture of lifelong learning. By making publications compulsory, we encouraged research, innovation, and global visibility of Indian dentistry.

This move wasn't just about compliance; it was about shifting the mindset- from seeing dentistry as a degree, to seeing it as a profession that requires continuous growth and contribution to science.'

Q. What key changes would you still like to see in Indian Dental education and practice in coming decade?

Dentistry in India has made remarkable progress, but there is still much to achieve if we want to prepare for the challenges of the coming decades. Some key changes I would like to see are:

Curriculum Modernization: A more dynamic curriculum that integrates digital dentistry, artificial intelligence, regenerative medicine, and minimally invasive techniques to keep our graduates globally competitive.

Stronger Research Culture: Encouraging original research at both undergraduate and postgraduate levels, with greater collaboration between dental colleges, medical institutions, and global research centres.

Public Health Integration: Oral health must be embedded into the national health agenda, with structured programs that make preventive dental care accessible to rural and underserved populations.

Skill-Based Learning: Shifting the focus from theory-heavy teaching to hands-on training, simulation-based learning, and mentorship that ensures practice-readiness.

Ethics and Professionalism: Reinforcing ethics, communication skills, and patient-centred care as a core part of education, so that future dentists are not only skilled clinicians but also compassionate professionals.

Interdisciplinary Approach: Building stronger bridges between dentistry and medicine, recognizing that oral health is inseparable from systemic health.

Global Exposure for Students: Exchange programs, international collaborations, and exposure to the latest technologies so that Indian dentists can both learn from and contribute to global best practices.

Use of Technology for Access: Artificial intelligence is not the future of dentistry- it is already shaping it. From diagnostics to treatment planning, AI is enhancing precision, speed, and predictability. Imagine AI algorithms detecting early cavities, oral cancers, or gum disease more accurately than the human eye, or designing complex prosthetics in a fraction of the time.

But let me be clear; AI will never replace the dentist. What it does is empower us- allowing us to make better decisions, reduce errors, and focus on patient care with empathy and skill. For young dentists, embracing AI means not just learning to use new tools, but understanding how technology and human expertise together can redefine patient outcomes.

Ultimately, AI is a partner in dentistry- it amplifies our abilities, but it is our knowledge, ethics, and human touch that remain irreplaceable.

Q. As a President of the Dental Council of India, what were your proudest moments during your tenure?

My tenure as President of the Dental Council of India was filled with challenges, but also with moments of deep pride and satisfaction. Some of the milestones I cherish most include:

Raising Standards of Dental Education: Strengthening regulatory systems to ensure quality teaching, better infrastructure, and competent faculty across dental colleges in India.

Expansion of Postgraduate Programs: Introducing and recognizing several new specialties and super-specialties, giving young dentists broader horizons and ensuring India could match international standards.

Positioning Oral Health in National Policy: Advocating successfully for oral health to be seen as a vital part of overall health, and laying the foundation for its inclusion in wider healthcare discussions.

Global Recognition of Indian Dentistry: Establishing India's presence on the international map of dentistry through collaborations, conferences, and academic exchanges.

Transparency & Ethics in Regulation: Taking firm steps to curb malpractices and promoting ethical education and practice, reinforcing the dignity of the profession.

Mentorship & Inspiration: Guiding a generation of dental professionals and witnessing the rise of young leaders who are carrying the vision of a stronger, globally competitive Indian dentistry.

"Looking back, my proudest moments are not just the policies we shaped, but the fact that dentistry in India gained recognition, respect, and a stronger foundation for the future."

Q. You were the first dentist in India to receive the Padma Shri and Padma Bhushan, a phenomenal achievement. How did these recognitions impact you personally and professionally?

Being the first dentist in India to receive both the Padma Shri and the Padma Bhushan was not only a moment of immense pride but also one of deep humility for me. These recognitions reaffirmed my lifelong belief that dentistry is not just a profession, but a service to humanity. On a personal level, they strengthened my sense of responsibility to give back even more to society, to my students, and to the next generation of dental professionals..

Besides the awards elevated the visibility and prestige of the dental profession in India, bringing it on par with other branches of medicine in the eyes of policymakers, the public, and international communities. They provided me with a stronger platform to advocate for oral health as an integral part of overall health. The recognition enhanced my credibility in policy circles, academic institutions, and global forums, enabling me to influence reforms in education, patient care, and healthcare policy with greater impact. Most importantly, it inspired countless young dentists to dream bigger, reminding them that excellence and dedication in dentistry can be acknowledged at the highest national level.

Q. You have had the rare honour of serving as the President of India's personal dentist for over 20 years. Could you share what that experience meant to you, both professionally and personally?

It has been one of the greatest honours of my professional journey to serve the Presidents and Prime Ministers of our country. When you are entrusted with the health of the highest offices of the nation, you realize that dentistry is not just a profession, it is a responsibility of the highest order.

Professionally, it demanded absolute precision, confidentiality, and integrity. At that level, there is no room for error- every detail matters, and the trust they place in you is sacred. Personally, it was humbling. Sitting across from them, you see not just leaders, but human beings who value care, comfort, and compassion just like any other patient.

For me, those moments reinforced a lesson I carry into every clinic and every patient interaction- whether it is the Presidents of India or an ordinary citizen, every smile, every tooth, and every patient deserves the same respect, dedication, and care. That is the true dignity of dentistry.

Q. Winning the DR.B.C ROY AWARD, the highest award in the medical field in India, is an extraordinary achievement. How did it feel to be recognized at that level, and what message do you think this sends about the role of dentistry in healthcare?

Winning the **Dr. B.C. Roy Award** was an incredibly humbling and proud moment for me not just personally, but for the entire dental fraternity. To be recognized with the **highest honour in the field of medicine in India** was a clear signal that dentistry is not a peripheral discipline, but a vital part of holistic healthcare.

When I received the award, I felt a deep sense of gratitude to my mentors, my patients, and my colleagues who walked with me on this journey. It wasn't just a recognition of my work, but of the evolution of dentistry in India. For decades, dentistry was often seen as separate from mainstream medicine. This award, I believe, helped bridge that perception it sent a strong message that oral health is fundamental to overall health.

Professionally, it reaffirmed my belief in excellence, ethics, and service. Personally, it was a reminder of my responsibility to continue mentoring, innovating, and advocating for the integration of dentistry within the broader public health framework.

Most importantly, it inspired a new generation of dental professionals to dream bigger. Awards come and go, but what they represent the recognition of dedication, the validation of hard work that stays with you forever.

Q. Over the past 40 years, dentistry has witnessed a technological revolution. From your perspective, how has your practice transformed from then to now?

Over the past 40 years, I've had the privilege of witnessing and being part of a remarkable transformation in dentistry. When I began my practice, dentistry was largely mechanical and manually intensive. The focus was on extractions, basic restorations, and pain relief. Technology was limited, and patient awareness was modest.

Today, we're in a completely different era. **Digital dentistry, laser technology, CAD/CAM systems, implantology, cone-beam CT scans, and microscopic endodontics**; these have revolutionized not just how we work, but how we think. We've moved from **reactive care to predictive, preventive, and minimally invasive treatments**. The level of precision we can

achieve today was unimaginable four decades ago.

More importantly, the **patient's experience has evolved**. There is greater emphasis on comfort, aesthetics, and long-term outcomes. Treatments that once took weeks can now be completed in a single sitting, with far greater accuracy and success rates.

Personally, adapting to this transformation has been both exciting and challenging. It has kept me curious, constantly learning, and open to innovation. I always believed that a practitioner must evolve with time and this field has pushed us to do exactly that.

But through all the advancements, one thing remains unchanged: **the human connection.** Technology is a tool, but empathy, ethics, and clinical judgment are what define a good dentist. And that, in my view, is the real heart of dentistry — yesterday, today, and tomorrow.

Q. You have mentored countless your dentists. What qualities do you believe are most essential for the next generation of dental professionals? And what qualities have you imbibed from them?

Mentoring young dentists has been one of the most fulfilling aspects of my career. Watching them grow from students filled with questions to confident, skilled professionals has been deeply rewarding.

For the next generation of dental professionals, I believe a few core qualities are absolutely essential:

1. **Integrity** — Above all else, dentistry is a profession of trust. No matter how advanced technology becomes, your ethics must be uncompromising.
2. **Lifelong Learning** — This field evolves rapidly. What you know today may be outdated tomorrow. Keep learning, keep questioning.
3. **Empathy** — Patients don't just bring their teeth; they bring their fears, expectations, and vulnerabilities. A successful dentist listens as much as they treat.
4. **Precision and Patience** — Dentistry is both an art and a science. Attention to detail, steady hands, and the patience to strive for perfection are vital.
5. **Vision** — Don't just aim to be a good clinician. Think about research, leadership, public health, and how you can shape the future of the profession.

But mentorship is never one-sided. I've learned a great deal from the younger generation as well. They bring with them **fresh perspectives, adaptability, digital fluency, and a boldness to challenge conventions**. Their passion, energy, and global outlook constantly push me to stay current, to think differently, and to keep moving forward.

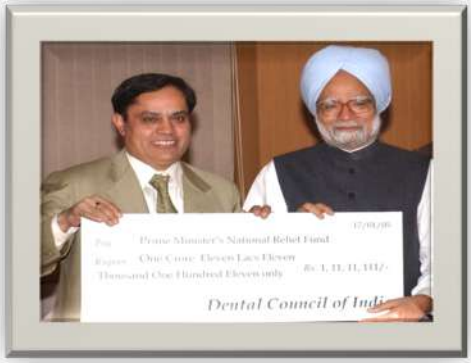
In many ways, they remind me why I entered this profession in the first place — to serve, to grow, and to leave it better than I found it. And that, I believe, is the true spirit of dentistry.

Q. What future projects or goals are you most excited about?

After 45 years of active clinical practice, my focus now is to give back to society in areas where the need is greatest. India is facing a silent epidemic in **geriatric oral health** and **oral cancer.** Our elderly often suffer from neglect- loss of teeth difficulty in chewing, poor nutrition, and loss of confidence. At the same time, oral cancer is one of the most common cancers in our country, yet it remains largely preventable with awareness and early detection.

My future projects are dedicated to these two causes. I want to build platforms for **preventive oral cancer screening**, especially in high-risk populations, and create accessible care models for our aging population so that no senior citizen suffers in silence because of oral health issues.

This is my way of ensuring that dentistry continues to serve society- not just in clinics, but in communities, where the impact is deepest.









Up to the minute

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MILA – Multiple Interactive Learning Algorithm
A Holistic Approach to Knowledge Sharing

The education landscape is rapidly evolving, with traditional pedagogical models increasingly viewed as insufficient for meeting the needs of today's learners. The Multiple Interactive Learning Algorithm (MILA) represents a transformative, research-driven approach that addresses the limitations of conventional teaching by integrating technology, active learning, and evidence-based instructional strategies into a dynamic classroom experience.

Conventional teaching methods, characterized by teacher-centered lectures and rote memorization, often result in passive learning environments. Students become mere

recipients of information, leading to disengagement, diminished critical thinking, and lower knowledge retention. These methods typically fail to accommodate diverse learning styles or foster essential skills such as collaboration and problem-solving skills that are increasingly vital in the 21st-century workforce.

Furthermore, traditional approaches prioritize standardized testing and academic rigor over developing practical skills and creativity. This disconnect between classroom learning and real-world application is especially problematic for secondary school students undergoing significant psychological and developmental changes and require more engaging and relevant educational experiences [3].

Rise of Student-Centered and Active Learning

Modern pedagogical strategies have shifted toward student-centered learning, technology integration, and active participation. Approaches such as flipped classrooms, problem-based learning (PBL), gamification, and collaborative activities have significantly improved student engagement, knowledge retention, and the development of higher-order thinking skills.

For example, flipped classrooms allow students to review materials independently before class, freeing classroom time for discussion and problem-solving. Studies have shown that this model enhances knowledge acquisition, self-study ability, and collaborative learning compared to traditional methods. PBL and simulation-based learning further promote critical thinking, clinical reasoning, and adaptability, preparing students for real-life professional challenges.

Gamification, incorporating game elements like points, challenges, and competition, has also proven effective in increasing student satisfaction, engagement, and knowledge retention, while fostering critical thinking and practical skills.

The MILA Framework: Structure and Philosophy

MILA is a structured, algorithmic approach to classroom instruction intersperses short, focused lectures with various targeted, interactive activities. Developed in response to the declining effectiveness of long, uninterrupted lectures, MILA divides a typical 120-minute class into several micro-sessions, each lasting about 20 minutes.

A standard MILA session begins with an 18-minute lecture, immediately followed by a 2-minute activity designed to reinforce and assess understanding. This is followed by an additional activity, selected from a diverse set of evidence-based teaching strategies, such as:

1. SCALE-UP (Student-Centered Active Learning Environment with Upside-down Pedagogies): Collaborative group work focused on problem-solving and experimentation.
2. Critical Pedagogy: Activities that encourage questioning, debate, and reflection on societal issues.
3. Jigsaw: Students become “experts” on different topic segments and teach their peers.
4. POGIL (Process Oriented Guided Inquiry Learning): Structured inquiry where students explore models, analyze data, and draw conclusions.
5. Concept Mapping: Visual diagrams to organize and connect concepts.
6. Game-Based Learning: Educational games, quizzes, and simulations to reinforce key ideas.
7. Role Play: Students act out scenarios to understand perspectives and practice real-world skills.

8. Flipped Classroom: Pre-class preparation followed by in-class application and discussion.
9. Peer-Led Team-Based Learning: Student teams solve complex problems under peer leadership.

This alternation between interactive and non-interactive activities is designed to maintain attention, cater to different learning styles, and foster deeper understanding. The teacher shifts from lecturer to facilitator, guiding discussions, supporting group work, and providing feedback to help students take ownership of their learning. Each activity is strategically chosen to alternate between interactive and non-interactive formats, ensuring that all learning styles are addressed and student engagement remains high throughout the session.

Implementation and Evidence of Effectiveness

MILA has been implemented in various educational settings, including engineering and dental education. Studies consistently report improved student engagement, enthusiasm, and performance compared to traditional lecture-based methods. For instance, an experimental study with undergraduate engineering students found that those taught using MILA achieved a pass percentage of 84.03%, compared to 76.26% for those taught with traditional methods- a statistically significant improvement.

Another study in dental education demonstrated that integrating interactive teaching methods, such as lectures followed by game-based activities, led to enhanced student performance and satisfaction. Feedback from students indicates that MILA's structure helps maintain attention, simplifies complex concepts, and provides a more active and enjoyable learning environment.

MILA also incorporates regular assessment and feedback, including formal, peer, and self-assessment, allowing students and instructors to identify areas of strength and improvement in real time.

Comparative Analysis: MILA vs. Traditional and Other Innovative Methods

Direct comparative studies of MILA versus other teaching models are limited. Still, existing research and analogies from integrated learning algorithms in computational fields support the superiority of blended, multi-strategy approaches. In the realm of artificial intelligence, ensemble methods, where multiple models are combined, consistently outperform single-method approaches in terms of accuracy, efficiency, and adaptability.

Translating this to education, MILA's integration of diverse, evidence-based strategies will likely yield better outcomes than traditional, single-method pedagogy. The systematic alternation of activities maintains attention, deepens understanding, and supports the development of critical thinking, collaboration, and adaptability- key skills for the modern world.

Role of Technology and Facilitator in MILA

MILA leverages technology as a core component, transforming digital distractions into powerful learning tools. Digital platforms support concept mapping, flipped classrooms, and game-based learning, aligning with students 'familiarity with technology and making learning more accessible and engaging.

The teacher's role is redefined from a knowledge transmitter to a facilitator who guides, supports, and motivates students. This shift empowers learners to take ownership of their education, engage in self-directed inquiry, and build self-confidence within their attention span.

Assessment and Feedback in MILA

Assessment is integral to the MILA framework. Each session includes formative assessments, such as quizzes, peer reviews, and self-assessments, allowing immediate feedback and continuous improvement. Summative assessments at the end of each week provide a comprehensive evaluation of student learning, ensuring that instructors and students can identify and address gaps in understanding.

Holistic Development and Real-World Readiness

Beyond academic achievement, MILA emphasizes the holistic development of students. MILA prepares learners to thrive in a competitive and rapidly changing world by fostering critical thinking, communication, leadership, and adaptability. The focus on inquiry, collaboration, and practical application bridges the gap between classroom learning and real-world challenges.

Conclusion

MILA represents a paradigm shift in education, moving from passive, lecture-based instruction to a holistic, student-centered, and technology-integrated model. By systematically alternating between concise lectures and diverse, interactive activities, MILA maintains student attention, enhances understanding, and supports the development of essential 21st-century skills.

Evidence from multiple educational settings demonstrates that MILA leads to higher student engagement, satisfaction, and academic performance than traditional methods. The integration of technology and the redefinition of the teacher's role as a facilitator further enhances the effectiveness and relevance of the learning experience.

As the demands of the modern world continue to evolve, educational frameworks like MILA offer a robust, adaptable, and evidence-based approach to knowledge sharing and skill development, ensuring that learners are well-prepared for the challenges and opportunities of the future.

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Rethinking Biomaterials in Regenerative Endodontics: From Scaffold Design to Clinical Success

Biomaterials: Foundation and Dental Applications

Biomaterials, defined as any material, natural or synthetic, engineered to interact with biological systems for a medical purpose, have revolutionized many areas of clinical medicine, including dentistry. These substances may be polymers, ceramics, metals, or composites, but their critical feature is biocompatibility, allowing safe integration or interaction with living tissues. In dentistry, biomaterials serve both structural and bioactive roles, from inert fillings and crown materials to advanced scaffolds that support cellular growth and regeneration.

Traditional dental biomaterials, such as gutta-percha for root canal obturation, dental amalgam for fillings, and calcium silicate-based materials like Mineral Trioxide Aggregate (MTA), have supported decades of successful tooth restoration. MTA, for example, is favoured for its sealing ability and biocompatibility, and Biodentine is used to repair root perforations or as a pulp capping agent. However, these conventional applications focus on replacing lost tissue or protecting against infection rather than true biological restoration. As tissue engineering and regenerative science evolve, the potential use of biomaterials expands beyond repair toward the **active regeneration** of dental tissues, a transformative goal for endodontic practice.

Necrotic Immature Permanent Teeth: Clinical Hurdles and Unmet Needs

Necrotic immature permanent teeth (NIPT), typically the result of trauma or severe infection in children and adolescents, pose significant treatment challenges. These teeth lack full root formation, presenting with open apices, thin walls, and fragile structures prone to fracture. Traditional treatment approaches, such as long-term apexification with calcium hydroxide or apical barrier techniques with MTA, are designed to induce apical closure or seal the canal, but these do not restore the vitality or the structural integrity of the pulp-dentin complex. Apexification results in brittle roots with increased fracture risk and does not allow further root maturation.

Regenerative Endodontic Procedures (REPs) emerged as a paradigm shift, aiming to reinstate tissue vitality and stimulate development within immature roots. These procedures typically involve disinfecting the canal, stimulating bleeding to form a clot (acting as a primitive scaffold), and sealing the tooth to allow endogenous cells to migrate and regenerate pulp-like tissue. Current clinical protocols often use techniques like revascularization, platelet-rich fibrin, or synthetic matrices. Despite promising short-term clinical results, including resolution of symptoms and partial root development, these techniques do not consistently recreate

true pulp-dentin tissue, and the variability of outcomes has led researchers to reconsider the importance of biomaterial selection and design.

Biomaterials and Scaffolds: Natural and Synthetic Solutions

The success of regenerative endodontics relies on the triad of stem cells, signalling molecules, and scaffolds—where **scaffolds**, created from biomaterials, provide the necessary framework and microenvironment for regeneration of the pulp-dentin complex. Both natural biomaterials, such as collagen, gelatin, chitosan, hyaluronic acid and fibrin, and synthetic options like PLLA, PLGA, PEG and polycaprolactone have been widely investigated.

tunable

Natural biomaterial scaffolds are highly biocompatible and can closely mimic the native extracellular matrix, supporting cell adhesion and migration. Collagen, for example, is widely used in endodontics for its cell-friendly nature, though it suffers from limited mechanical strength and unpredictable degradation. Chitosan, derived from shellfish, offers antimicrobial properties and supports tissue ingrowth. Synthetic materials, including PLLA, PLGA, self-assembling peptides and Pluronic F127, offer properties and controlled degradation rates, making them attractive for customized scaffold designs.

Hydrogels, in particular, have revolutionized pulp-dentin regeneration for NIPT, as their injectable nature facilitates minimally invasive placement in the small tortuous root canal and allows precise adaptation to complex canal morphologies. Their porous structure supports nutrient diffusion, cell encapsulation, and delivery of bioactive agents.

Ideal scaffold design requires careful consideration of several factors: mechanical stability for tooth function, bioactivity to guide cellular behaviour, and adaptability to the root canal's geometry. Scaffolds can also be engineered for controlled release of signalling molecules or growth factors like BMPs, VEGF, and TGF-β, that promote angiogenesis, cell differentiation, and tissue formation.

Research Progress and Translational Challenges

Around the globe, research teams are focused on designing the "ideal biomaterial" for regenerative endodontics. Modern strategies centre on fostering biologically active environments within the tooth using advanced scaffolds, micro- and nanostructured materials, and even three-dimensional (3D) bioprinting. Studies demonstrate that injectable hydrogels (e.g., gelatin methacryloyl—GelMA) and bioactive nanofibrous matrices can improve cell homing, retention, and differentiation, resulting in more robust pulp-dentin regeneration and continued root development. Some protocols combine biological and synthetic matrices, harnessing the biocompatibility of natural materials while integrating the mechanical advantages of synthetics.

Recent advances highlight the use of hydrogel microspheres as injectable bioscaffolds. Compared to bulk hydrogels, these microspheres offer superior oxygen and nutrient diffusion due to the enhanced porosity of the dispersed system. This property promotes improved cell survival, adhesion, proliferation, and extracellular matrix (ECM) secretion. Furthermore, microsphere-based systems exhibit greater plasticity, enabling better adaptation to the complex anatomy of root canals than bulk hydrogels.

A recent scoping review on injectable hydrogels for endodontic regeneration unequivocally indicates that injectable hydrogels employed as scaffolds in regenerative endodontics are currently in the nascent phases of the translational roadmap. Both basic and applied research endeavours are advancing in this domain, marked by the innovation of novel injectable hydrogels tailored for regenerative endodontics. However, the journey towards commercializing a product for clinical application remains extensive. Significantly, there persists an unmet need to formulate an optimal injectable hydrogel specifically designed for the requirements of regenerative endodontics.

Other promising innovations include gene therapy, a direct delivery of genetic material encoding for growth factors to stimulate regeneration, and controlled-release systems, which provide precise delivery of bioactive signals in the root canal space. Cell-free approaches, utilizing biomaterials and signalling molecules without direct stem cell transplantation, are also being optimized for clinical practicality and reduced immune rejection risk.

Although substantial progress has been made in the fabrication of biomaterial scaffolds, significant translational barriers persist. Variations in clinical protocols, patient-specific responses, regulatory hurdles for new biomaterials, and the complexities of manufacturing and ensuring sterility impede rapid adoption. Standardized procedure guidelines and consensus on biomaterial selection are still evolving. Safety and long-term success must be validated in multicentre clinical trials, as sustained viability and functionality of regenerated tissues are needed for reliable treatment outcomes.

Despite these hurdles, recent research has come closer than ever to fulfilling the promise of **true regenerative care** for NIPT. Collaboration between bioengineers, material scientists, and clinicians is accelerating the development of off-the-shelf biomaterials, 3D printed scaffolds, and protocols personalized for patient needs. Advanced biomaterials and scaffold strategies offer not just hope for immature necrotic teeth but the broader transformation of endodontic therapy into a tissue-restorative discipline.

Future Directions: Toward Clinical Success

Regenerative endodontics, powered by innovations in biomaterial science, stands at the threshold of routine clinical application for conditions once considered untreatable. The goal is to design robust yet bioactive scaffolds that reliably guide endogenous or transplanted stem cells to form sustained, vascularized pulp-dentin complex tissue. Next-generation biomaterials must be affordable, easy to use in the operatory setting, and supported by long-term safety and efficacy data.

Emerging research explores the integration of artificial intelligence in scaffold design, personalized 3D bioprinting of root canal scaffolds, and the use of smart biomaterials that respond dynamically to biological signals for optimal regeneration. As research continues, the translation from bench to chairside depends on interdisciplinary teamwork, regulatory harmonization, and global clinical trials verifying effectiveness across diverse populations and dental presentations.

In summary, the journey from scaffold design to clinical success depends on thoughtfully engineered biomaterials, robust translational science, and renewed clinical protocols. Progress in regenerative endodontics promises not only to save teeth but also to restore natural tissue function and vitality for millions worldwide.

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AI and Quantum Technology enhanced Endodontics: from Perception to Physical Reality

In the fast changing world of technology, nothing is changing faster than artificial intelligence (AI) and associated technologies. The AI wave in healthcare is already transforming patient care by improving diagnostic accuracy, enhancing operational efficiency, and increasing efficiency and access to care. Artificial intelligence, refers to the use of computer technology to simulate human-like judgment, reasoning, and intelligent behaviour. AI has excellent visual perception, speech recognition, decision making and language translation and hence it is here to perform tasks that require human intelligence.AI tools analyze large datasets and learn from patterns to detect diseases, automate and optimize administrative tasks such as treatment planning and documentation to enhance diagnostic precision and procedural efficacy as well as to predict prognosis and treatment outcomes in turn reducing human burnout.

We are already using AI with various office and practice management softwares. Apples's Siri and Amazon's Alexa, are commonly used voice command devices are just a few examples. In the healthcare sector, AI finds use in both virtual and real (robotics) contexts. The mathematical formulae for medication dose, diagnosis and prognosis, appointment scheduling, drug interactions, electronic health records, and imaging are the core areas of the virtual type. The physical side includes tele-presence, robotic help during surgery, rehabilitation, and companion robots for geriatric care. Dr. Promila Verma in 2024 IES newsletter, Vol3; Issue 2 had presented an excellent insight into the role of AI in Endodontics.

As the world celebrates the 2025 International Year of Quantum Science and Technology, it's natural to discuss this sphere of technology and see what it can offer to the field of Endodontics. Quantum technology (QT) is a rapidly evolving field that leverages the principles of quantum mechanics to develop innovative systems and devices with capabilities beyond the traditional technologies. It encompasses three primary areas namely, Quantum computing (QC), Quantum sensing (QS) and Quantum communication (QCn). Quantum computing, with its qubits operating in superposition and entanglement states is promising an exponential leap in techno-learning, material science and drug discovery.

Manipulating the realm of the "ultra-small" has led to emergence of a domain of "Quantum sensing" with Quantum sensors. Traditional computers use bits which are like switches that are either in a state of 0 or 1. Quantum computers use quantum bits or qubits. Qubits can be in a state of 0,1 or both at the same time due to superposition and entanglement. To put it in simple terms traditional computer is like a person trying to solve a maze by checking each path one by one, whereas, a Quantum computer is like an entire team solving every path simultaneously!!When QT converges with AI- known for its prowess in pattern recognition, predictive analytics and decision making, is capable of revolutionizing Endodontics like all other fields of Health care.

As I delved into numerous articles discussing the rapid stride in artificial intelligence(AI) and quantum technologies (QT), my reflections on the ongoing research in these fields and curiosity led to unfolding of a cascade of intriguing possibilities in the field of Endodontics that are discussed here.

Prospective applications of AI with QT

AI is already managing electronic health records, billing, patient scheduling. Health monitors are already in the market and chatbots are being used in full swing. To put it simply, AI can provide the brain and QC can provide power. Integrating AI and Quantum technology in endodontics is an exciting area of research and development of digital technologies like Radiography, CBCT and CADCAM. AI together with QT can transform endodontics by enhancing diagnostic accuracy, treatment planning, and clinical outcomes. Also, AI powered training programs on simulators can upskill budding endodontists, Further, AI with Machine Learning could enable adaptation and reinforcement learning from interactions. Hence AI can guide QC and QC can in turn feed AI.

QC can assimilate and comb laboratory test results, radiographs, pulp sensibility tests, life style factors, clinical records as one enormous dataset, search for patterns that indicate best treatment that would work best for the patient. Further Quantum algorithms could help analyze patient data, solve logistic issues, schedule follow-ups and analyze follow-up records for doctors and suggest need for further treatment. In endodontics, key innovation–driving segments include diagnosis and imaging, equipment and devices and robotics. In the field of research, QC can optimize clinical trials by doing patient matching, identifying variables and so on.

Research on Deep learning technique of AI has helped analyze radiographs and CBCT scans with speed and accuracy to detect and classify as well as quantify periapical lesions early, root

fractures, and other endodontic issues enhancing Diagnostic Imaging. CBCT had 90% sensitivity and a false negative of 10% in VRF teeth and 80% specificity and a false positive of 20% in teeth with no VRF. Using Transfer Learning techniques for enhancing VRF detection, scientists are working to optimize CBCT images along with Deep Learning Image enhancement to improvise the specificity. Quantum enhanced algorithms might further improve radiographic and CBCT interpretations for detecting PA lesions or root fractures.

With the integration of quantum technology, lower mA setting at the X-ray source and high Quantum efficiency (QE) at the detector level with quantum sensors could be applied to current imaging technologies. This shall considerably reduce dose exposure without compromising image resolution in the near future. Consequently, a lower mA setting at the X-ray source and the use of front illuminated sensors with micro lens or back illuminated sensors at the detector level for an increased QE that reduces the required radiation dose and sensor pixel size without impacting image quality should have a dramatic positive impact on dental radiology and oral diagnosis. Quantum enhanced AI algorithms shall be able to analyze images along with patient records that traditional computing and shall not only help in diagnosis ruling out human oversight but also establish 3D printing of customized endodontic instruments for cleaning and shaping. We already know that a MRI machine measures the quantum properties of atoms, using quantum sensors consisting of electromagnetic coils that detect the magnetic flux produced when atomic spins change direction. MRI classically offers superior soft tissue contrast with no ionizing radiation. More recently, a new generation of nanoscale quantum sensors have emerged that are sensitive enough to detect magnetic fields emitted by a target biological system and these can be explored in diagnostic imaging for endodontics for pulp as well as periapical lesions. QT Sense, a company based in the Netherlands, is using nano-diamonds and quantum technology to build nano-MRI scanners. Thus, Quantum enhanced MRIs could find their way

in the dental operatory and could become a boon for endodontists and surgeons who can then use MRI imaging for routine endodontic procedures.

Quantum sensors, harnessing the intrinsic quantum phenomena of entanglement and superposition, have also demonstrated an extraordinary capacity for detecting disease-associated biomarkers at the most incipient stages, showcasing unprecedented sensitivity. Sensors can bridge digital commands and physical actions with the aid of actuators. Whereas, Quantum dots are semiconductor nanoparticles that exhibit unique optical properties, including fluorescence, which makes them valuable for high-resolution imaging. Nano-biosensors like quantum dots are enabling real-time detection of oral pathogens. These sensors are typically designed to bind selectively with disease-specific biomarkers, providing rapid and precise readings of bacterial presence. For instance, in periodontology, nano sensors have been used to detect bacteria such as *Porphyromonas gingivalis*, at very low concentrations, facilitating timely intervention. In Endodontics, a similar application with quantum sensors for quantifying crucial biomarkers of pulpal inflammation such as Substance P, TNFα, IL-6 and IL-8 can aid in vital pulp therapy.

In the field of treatment planning once clinical practice workflows are established, integration of AI with health record systems will aid in giving us the optimized treatment plan. This shall set a trend for tailor-made treatment best suitable for patients as quantum technology shall integrate patients history, case records, clinical findings, pulp vitality/ sensibility tests and radiographic findings along with established biomarkers. Just like Digital smile designing software's we shall be using Digital Endodontic Tools!

Quantum dots and sensors could be used not only to detect pulpal inflammation but can also be used to load bioactive agents and release them in specific areas of the exposed pulp for repair and regenerative purposes. Nanotechnology driven AI and QC can optimize NP formation and work to ensure optimal drug delivery and therapeutic outcomes. Using ML algorithms of AI predicting biocompatibility of novel biomaterials, testing their physical properties can become fast and efficient without the need for animal testing. Hence newer endodontic biomaterials or existing endodontic materials with enhanced properties with mono-block effect could be in the horizon.

Apex locators already have enhanced accuracy due to impedence detection and algorithms and they are already providing real-time feedback on the file's position within the canal and flagging the apex or over instrumentation. Integration of AI with haptics integrated apex locators to flag calcifications, ledges, foreign bodies could be explored. Similarly, sensor embedded in endodontic instruments could give us real-time feedback about the root canal anatomy. Irrigation devices with sensors in the future will detect and have the ability to irrigate in complex anatomical areas of the root canal like fins, isthmuses' and canal bifurcations making apical 1/3rd cleaning more predictable. Obturation devices shall also be AI enabled with haptics to predict material filling under different sections of the root canal system. Post-endodontic restorations shall also have similar advancements.

The world is racing into physical AI. Medical devices are being embraced rapidly, driven by a growing population, surging health issues and innovation. If we don't do it, someone else will build for us. And hence we should move fast enough and leapfrog into innovation and manufacturing. AI guided robots performing endodontic procedures/ surgeries as well as autonomous sterilizing and disinfection of the operatory shall be the future.

Challenges and the way forward

AI can help clinicians provide more personalized and effective treatment. However, challenges such as data privacy issues, algorithmic biases, and integration barriers need to be addressed for broader adoption. Moreover, whether poor data resolution, image overlaps can pose accuracy challenges also need to be explored. Overall, AI and Quantum technology have the potential to revolutionize endodontics by improving diagnosis, treatment planning, and patient outcome. The delicate nature of quantum hardware, the necessity for error correction and the scalability of quantum systems are barriers to be overcome in the long run in Quantum technologies.

The world is racing into technology with and AI and QT and we have to innovate and manufacture. There are lots of different quantum-based companies and institutions working in the Indian healthcare sector like Uni space and Quantum Biosciences. The government of India has launched the National Quantum mission from 2023 to 2030 with a total fund of over 60,000 crores aiming to seed, nurture and scale up scientific and industrial research and Development in Quantum Technology. Each state has launched summits and departments for the same. India's first Quantum Computing Valley is coming up in Amravati (Andhra Pradesh) by January 2026 with special focus on healthcare. We need systems and devices trained on Indian data and Indian climate We need to build our own sensors. Time is ripe to innovate and manufacture world class Endodontic devices with AI and QT and even explore physical AI. If we have some world class endodontic products, the globe shall come knocking for more. We need endo devices/systems and materials that shall bridge the digital and physical gaps. We should not remain importers and consumers rather we should be exporters and manufacturers of endodontic expedients.

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Endocrowns: a novel approach for restoring severely compromised endodontically treated anterior and posterior teeth

The final definitive restoration following endodontic treatment plays a crucial role in the longevity and final outcome of root filled teeth. Planning & executing the post endodontic restoration is even more challenging in structurally compromised & grossly mutilated teeth. For several decades these teeth were restored with custom cast post and core followed by full coverage crowns. Though this approach had a good survival rate it was slowly discontinued attributing to the catastrophic failures of such restorations which were classified as unfavourable failures. When these restorations fail it is almost always irreparable leaving the clinician with extraction as the only possible treatment option. Also, endodontic intervention for retreatment when required was extremely tough. These reasons made the custom cast post and core restorations less popular in modern dentistry.

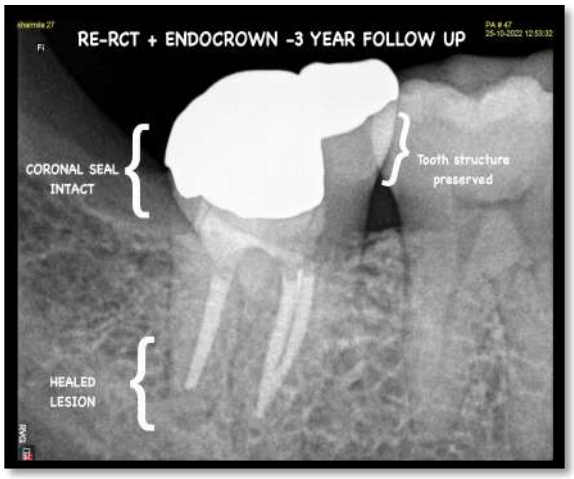
The paradigm shift towards fibre posts was preferred by clinicians as these posts were tooth coloured, were bondable to root dentin and more importantly allowed easy intervention to root canals if endodontic retreatment was required. More importantly these fibre posts had modulus of elasticity similar to that of root dentin allowing better stress distribution and hence failures were more favourable as it did not cause catastrophic structural failure of tooth structure and always had the possibility of restoring the teeth again. But even this bonded fibre post & core technique required extensive tooth preparation removing all the enamel to make the tooth receive a full coverage ceramic restoration.

Partial bonded restorations like overlays & veneers have become popular in restorative dentistry due to the conservation of tooth structure while preparing these teeth to receive such a restoration and also the simplicity of these procedures which solely depend on the adhesion rather than parallelism and tenso-friction in the preparation for traditional crowns. Bonded restorations are now popular endodontically treated teeth too as an alternative to traditional crowns.

The aim of this short write-up is to highlight how Endocrowns in particular can be the new alternate to traditional post, core and crowns in grossly mutilated teeth that require endodontic intervention. In general post, core and crown were indicated for teeth that have less than 50% of healthy tooth structure left. In this short review, 2 cases demonstrating Endocrowns, fabricated with monolith ceramics to restore teeth that would have been restored with the traditional approach normally are showcased. The advantage in doing such preparations is that it does not require axial preparations which removes all the enamel. Note how the enamel & width of natural tooth structure is preserved which can protect the tooth from flexural failures.

CASE 1:

Failing RCT in 47 with periapical lesion & less than 50% remaining tooth structure. Endodontic retreatment done & Endocrown bonded with 3 years follow up.



CASE 2:

Endocrown in anterior tooth #22 with less than 50% tooth structure.

3 year follow-up

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Biological Membranes in Vital Pulp Therapy: PRF, Amniotic Membrane, and Chorion

Vital pulp therapy (VPT) is described as "the techniques which aim to treat reversible pulpal injury, whenever dentin and pulp are affected by caries, restorative procedures, or trauma" by the American Association of Endodontics. Using the dentinogenic potential of the pulpal cells, pulp capping is one such treatment strategy that protects pulp vitality in cases of reversible pulp injuries brought on by trauma, iatrogenic exposure, or mechanical exposure during the removal of deep caries.[1,2] Direct pulp capping (DPC) involves covering exposed pulp with a bioactive material with the goal of causing differentiation of odontoblast-like cells that would eventually produce reparative dentin at the pulp-capping material interface by enhancing the biosynthetic activity of adjoining primary odontoblasts,[3] and, the reconstruction of the dentinal defect with a bridge made of reparative dentin that is directly continuous with reactionary dentin around the pulp exposure is the most desirable result[4]. Traditionally, Calcium hydroxide, and more recently, mineral trioxide aggregate or Biodentine have been the most popular VPT agents.

Recent advances in regenerative materials have shifted the focus from purely synthetic bioactive agents, such as calcium hydroxide and mineral trioxide aggregate, to biological membranes that provide both structural and biological support for pulp healing. Among these, platelet-rich fibrin (PRF), amniotic membrane (AM), and chorion membrane (CM) are increasingly studied for their potential to serve as scaffolds, bioactive reservoirs, and protective barriers during VPT.

Platelet-Rich Fibrin (PRF) in VPT

P RF, which is classified as a second-generation platelet concentrate. Leukocytes, platelets, and cytokines such as interleukins, TGF-β, and VEGF are abundant in this autologous bioactive material, which reaches a high level in about two weeks. PRF has been used successfully in regenerative endodontics, surgical endodontics, and perforation repair. Recently, this biomaterial has shown promising outcomes in VPT cases as a pulpotomy agent.[5] In a randomized control trial conducted by Shobana et al.[6] in 2022, the quality of dentin bridge formed under the site of exposure was assessed using a CBCT, which gave a 3-D reconstructed image of the dentine bridge and found that he platelet concentrates PRF and PRP (platelet-rich plasma) formed a significantly higher volume of dentine bridge than MTA. PRF has been investigated as a capping agent following mechanical or carious pulp exposure.[7] Its fibrin scaffold protects the pulp while delivering growth factors that stimulate odontoblast-like cell differentiation and reparative dentin formation. The leukocytes in PRF exert antimicrobial and anti-inflammatory effects, reducing pulp inflammation and facilitating tissue repair. Studies comparing PRF with MTA or calcium hydroxide in pulpotomy procedures have reported comparable or superior clinical outcomes, particularly in immature permanent teeth. PRF provides an autologous, biologically active alternative that can accelerate dentin bridge formation. It is easy to prepare chairside, cost-effective, autologous (hence no immune rejection), and has sustained release of growth factors for up to 14 days.[8]

Human Amniotic Membrane (hAM) in VPT

The hAM is one biological substitute that seems promising for regenerative endodontics.[9] It is derived from the innermost fetal membrane, consists of a basement membrane and stromal matrix rich in collagens, fibronectin, laminin, and a spectrum of growth factors. hAM has

possessed anti-inflammatory, antibacterial, and antiviral characteristics. Studies have reported that amniotic epithelial cells secrete soluble factors inhibiting innate and adaptive immune system cells. Anti-inflammatory factors, such as interleukin(IL)-1, IL-10, IL-2 receptor antagonists, and matrix metalloproteinase inhibitors, are produced by amniotic cells.[11]

hAM provides an extracellular matrix–like structure that supports adhesion, proliferation, and differentiation of dental pulp stem cells (DPSCs). This is critical in promoting reparative dentinogenesis after pulp capping or pulpotomy. When placed over the exposed pulp, hAM acts as a biological dressing, protecting pulp tissue from bacterial infiltration and providing a conducive environment for healing. Preliminary studies have reported successful outcomes when AM was used as a capping material in partial pulpotomies, showing dentin bridge formation and absence of postoperative symptoms

Chorion Membrane (CM) in VPT

The chorion, derived from the outer fetal membrane, is structurally thicker and more resilient than the amniotic membrane. It contains multiple layers of mesenchymal stromal cells, trophoblasts, and extracellular matrix proteins, providing both mechanical strength and a reservoir of bioactive molecules. CM supports the migration and differentiation of DPSCs, creating a regenerative microenvironment similar to AM but with superior tensile strength. Due to its barrier properties, CM has been used to cover pulp exposures in vital pulp therapy, preventing microbial penetration while allowing controlled release of growth factors. Case reports have demonstrated positive clinical and radiographic outcomes when CM was used in pulpotomy of immature permanent teeth, showing continued root development and apical closure.[12]

Comparative Overview

While PRF, AM, and CM all contribute to pulp healing and regeneration, their roles vary based on their origin and biological properties:

- PRF: Autologous, easily prepared chairside, rich in growth factors, ideal for enhancing reparative dentinogenesis and controlling inflammation.

- AM: Allogeneic, biologically active with anti-inflammatory and anti-scarring properties, acts as a protective membrane with angiogenic potential.
- CM: Allogeneic, mechanically stronger than AM, provides long-lasting scaffold and growth factor release, well-suited for combination with bioceramics in VPT.

The application of biological membranes in vital pulp therapy marks a paradigm shift from traditional reparative approaches toward true biological regeneration. PRF, amniotic membrane, and chorion each offer unique biological and mechanical properties that support pulp preservation, angiogenesis, and dentin bridge formation. Their incorporation into VPT protocols not only improves clinical outcomes but also expands the possibilities of regenerative endodontics. With growing evidence, these biological scaffolds are poised to become integral to the future of pulp therapy.

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Artificial Intelligence in Endodontics: What It Will Do, What It Won't Do, and Why Ethics Matter

Artificial Intelligence (AI) is steadily moving from research labs into our clinics, radiology suites, and classrooms. In endodontics, where precision and prediction define success, AI promises to be a game-changer. Yet, amid all the excitement, it is crucial to remain realistic. AI is not a magic wand; it has clear strengths, definite limitations, and complex ethical questions attached.

This article explores three dimensions: **what AI will do**, **what it will not do**, and **why ethical considerations are central** to its adoption in Indian endodontics.

What AI Will Do

1. Detect Problems Earlier and Faster

One of the strongest contributions of AI in endodontics is in imaging. Deep learning systems trained on thousands of radiographs can highlight periapical radiolucencies, apical resorption, or vertical root fractures.[1] This "second reader" effect increases sensitivity, reduces oversight errors, and speeds up reporting. In teaching hospitals and busy practices, this means more consistent detection and quicker triage.

2. Map Complex Anatomy in 3D

Root canal systems are notorious for their variability. Automated CBCT segmentation with AI can now delineate teeth and canal pathways in seconds.[2] This provides clinicians with detailed 3D maps that make treatment planning, especially in calcified, curved, or C-shaped canals much easier. It reduces guesswork, helps in selecting instruments, and improves communication with patients about the complexity of their cases.

3. Guide Us with Greater Precision

When AI-processed scans are integrated into dynamic navigation systems, endodontists can achieve highly precise access cavities and microsurgical osteotomies.[3] In calcified teeth or retreatment cases, AI-enhanced planning makes it possible to preserve tooth structure and minimize the risk of iatrogenic errors. This is particularly valuable in microsurgery, where AI-assisted planning and navigation reduce surgical time and operator stress.

4. Standardize Quality Checks

Post-treatment radiographs are often judged subjectively by clinicians. AI can objectively analyze obturation quality - length, density, and presence of voids, providing immediate feedback.[4] This helps standardize treatment evaluation across clinics, ensures consistency in postgraduate training, and creates reliable datasets for research and audits.

5. Forecast Treatment Success

Predictive models are being trained to estimate healing outcomes based on lesion size, pre-operative radiographs, systemic health factors, and quality of obturation.[5] These tools can suggest individualized recall intervals and inform patient discussions about prognosis. Instead of relying only on experience, clinicians will have population-based learning models that guide personalized care.

6. Transform How We Teach

AI-driven simulators can track a student's file movement in a plastic tooth, grade their access preparation, and give feedback on canal scouting.[6] This allows for objective evaluation, reduces faculty workload, and accelerates learning. Over time, AI could form the backbone of competency-based education, bridging the gap between preclinical training and real patient care.

What AI Will Not Do

1. Make the Final Diagnosis for You

AI can point to a suspicious radiolucency, but it cannot decide whether it is pathologic, healing, or clinically irrelevant. The interpretation of findings in the context of symptoms and patient history remains the clinician's responsibility.[7]

2. Replace Tactile Expertise

Negotiating a calcified canal, gauging apical size, or feeling resistance during obturation are tactile skills built on experience. No algorithm can replicate the nuanced "feel" of endodontics.[8]

3. Build Relationships with Patients

Endodontic success is not just about technique - it is also about trust, empathy, and communication. Patients need reassurance, motivation, and confidence in their doctor, which AI can never provide.

4. Eliminate Error

AI models can underperform when applied outside their training environment. A system trained on European CBCT scans may not perform equally well in Indian clinics due to differences in machines, protocols, and patient populations.[9] Without validation, errors are inevitable.

5. Replace Regulations and Standards

Every AI tool must be tested, validated, and approved. Frameworks like TRIPOD-AI and CONSORT-AI are being developed to ensure transparency and safety.[10] Without proper regulation, AI could do more harm than good.

Why Ethics Matter in AI-Driven Endodontics

AI is not just a technical tool, it brings profound ethical challenges. For Indian endodontists, ethical integration is as important as technical adoption.

1. Protecting Patient Data

Radiographs, CBCT scans, and clinical records are sensitive. Under India's Digital Personal Data Protection Act, 2023, such data must be handled with transparency, consent, and security.[11] Before using patient data to train or test AI models, clinicians must ensure informed consent and anonymization.

2. Avoiding Bias and Inequality

If AI tools are trained only on Western datasets, they may misdiagnose Indian cases. This can worsen health inequalities. Local validation using Indian patient data is essential to avoid systemic bias and ensure accuracy for our population.

3. Transparency and Explainability

Black-box systems that give results without explanation can undermine trust. Endodontists must be able to see *why* AI flagged a lesion, using heatmaps or overlays. Explainable AI is key for accountability and acceptance.

4. Accountability and Legal Responsibility

If an AI system makes a wrong prediction, who is accountable - the clinician, the hospital, or the software company? For now, the burden lies with the clinician. Ethical practice means treating AI as an advisor, not as the decision-maker.

5. Accessibility and Equity

There is a risk that AI tools will only be available in corporate hospitals or elite practices, leaving rural and resource-poor clinics behind. Professional societies like the IES must advocate for equitable access so AI benefits all patients, not just a privileged few.

6. Continuous Monitoring and Updates

AI models can drift over time, especially when imaging equipment or case profiles change. Ethical use requires ongoing monitoring, validation, and updates. Clinicians must demand clear update policies and accountability from software developers.

Towards a Human–AI Partnership in Endodontics

AI is poised to enhance almost every stage of endodontic practice—from the way we detect lesions, map canal systems, and plan surgeries to how we evaluate outcomes and train the next generation of specialists. Its strengths lie in standardization, speed, and pattern recognition at a scale the human eye cannot achieve. But endodontics has always been more than technical precision. It is a specialty defined by tactile skill, nuanced judgment, and the trust between doctor and patient.

The future will not be about choosing between human expertise and AI, it will be about bringing the two together. Endodontists will continue to lead with experience, empathy, and hands-on dexterity, while AI will serve as a reliable assistant, highlighting what might be missed, reducing variability, and giving us new confidence in our decisions.

If adopted with care, AI can raise the standard of care in India and worldwide, helping clinicians practice with greater accuracy, patients receive treatment with greater predictability, and students learn with greater clarity. The real measure of success will not be whether AI can work on its own, but whether it can make us better endodontists, delivering safer, more effective, and more human-centered dentistry.

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Advancements in Endodontic Microsurgery: Precision, Predictability, and Patient-Centered Outcomes

The field of endodontic surgery has come a long way over the years. In the past, thorough knowledge about the pulpal morphology, endodontic microflora and the spread of infection from the oral cavity was extremely inadequate. With the development of newer technologies, we were able to better understand the micro- anatomy of the entire pulpal system. These advancements also provided us with a thorough insight on the infectious process within the pulpal system well as its defence mechanisms against such infections. due to an enlightened understanding of the pathobiology of the peri radicular lesions and a detailed understanding of the endodontic microflora, the outcome of endodontic treatment has become predictable. With current instruments and instrumentation techniques, the current success rate of 96-98% can be anticipated in properly treated cases.

Initially, dentists *attempted* root canal treatment rather than *performing a predictable* procedure. This lack of confidence was due to inadequate knowledge about the subject and outcomes.

Evolving scientific literature brought the exact failures of root canal treatment to light.

To overcome this problem, practitioners sought apical surgery as a final treatment option to save the tooth. Since the failures were encountered inspite of orthograde cleaning and obturations they thought that , elimination of the periapical pathology could be undertaken by a surgical approach to the root apex. As a result, all retreatable endodontic cases were also considered for periapical surgery. However, with time, it was noticed that the success of primary endodontic treatment as well as endodontic retreatment increased drastically. As a result, the need for periapical surgery has substantially reduced and an endodontic retreatment therapy should be carried out as the first choice of treatment whenever possible. Surgical intervention should be taken up after giving ample healing time after completion of orthograde treatment.

Currently, the niche of periapical surgeries has become very narrow with very specific evidence-based indications for the same. Albeit the indications are very specific, the success of periapical surgery is high and the outcome of this treatment modality is predictable.

It is important to emphasise periapical surgeries should be performed by endodontists as the long- term success rate of such surgeries is very high when performed using the surgical microscope. In our country, it is important to remember that despite specialising in a specific field, many dental students perform procedures pertaining to general dentistry in their clinics.

Admittedly, once the dental student has been exposed the field of surgical endodontics, they become aware about the nuances of surgeries. This includes the significance of pre- operative evaluation of the patient, the diagnosis, lab tests needed, impact of systemic conditions on the surgery as well as post- operative management of the patient. The student understands of the basic principles of surgery. Lastly, the dental student simultaneously gains the confidence to perform intra oral surgeries which may be helpful in their future.

1. The Role of the Surgical Microscope:

The introduction of the surgical microscope into endodontics has been a pivotal advancement in microsurgery. High-powered magnification allows clinicians to visualize the surgical field with unprecedented clarity, improving the precision of every step of the procedure. This enhanced visualization aids in:

Improved Identification of Anatomical Structures: The surgical microscope enables the identification of tiny root canal systems, and anatomical anomalies that were previously difficult to visualize with the naked eye or under traditional magnification. This capability allows for more accurate localization of the root apex, reducing the risk of damage to surrounding structures.

Minimized Surgical Exposure: With greater magnification, the surgeon can make smaller incisions, thereby minimizing trauma to soft tissues. This results in faster healing times and less postoperative discomfort for the patient.

Increased Success Rates: Enhanced visualization contributes to more accurate root-end preparation, better sealing of root-end cavities, and more precise resection of infected tissue, all of which have been shown to improve the long-term success of endodontic microsurgery.

2. Ultrasonic Instruments:

Ultrasonic technology has revolutionized root-end preparation and apical surgery. Unlike traditional rotary instruments, ultrasonic instruments use high-frequency vibrations to cut through bone and root structure. This technology offers several advantages:

Precision and Control: Ultrasonic instruments provide superior control over the cutting depth and the ability to shape root-end cavities precisely. This reduces the chances of over-preparing or under-preparing the root-end, which can negatively impact the long-term prognosis.

Minimally Invasive: Ultrasonic instruments are capable of performing delicate bone surgery with minimal damage to adjacent tissues. This reduces the extent of bone removal and results in less postoperative swelling and discomfort.

Enhanced Cleaning and Disinfection: The ultrasonic tips can be used to improve the cleaning and debridement of root-end cavities, promoting better disinfection and minimizing the risk of reinfection.

3. Biocompatible Materials:

The use of biocompatible materials for root-end fillings has significantly enhanced the success of endodontic microsurgery. Materials such as mineral trioxide aggregate (MTA), Biodentine, and other bioceramics have become the gold standard for root-end sealing due to their excellent sealing ability, biocompatibility, and regenerative properties. These materials provide several benefits:

Improved Healing: MTA and other bioceramics promote the formation of a stable, predictable seal at the root-end, reducing the likelihood of persistent infection or complications after surgery. These materials also support tissue regeneration, encouraging the healing of surrounding bone and soft tissues.

Reduced Postoperative Complications: Bioceramic materials are non-toxic and non-inflammatory, reducing the risk of adverse reactions in the surrounding tissues and improving patient comfort during recovery.

Enhanced Success Rates: The use of MTA and similar materials has been shown to significantly improve the success rates of endodontic microsurgery, with studies reporting success rates exceeding 90% when these materials are used for root-end fillings.

4. Cone Beam Computed Tomography (CBCT):

Cone beam computed tomography (CBCT) has emerged as a valuable tool in preoperative assessment and postoperative evaluation of endodontic microsurgery. CBCT offers several advantages over traditional radiography, including:

3D Visualization: Unlike conventional 2D X-rays, CBCT provides three-dimensional images of the entire root canal system and surrounding structures, allowing for better preoperative planning and more precise surgical navigation.

Accurate Localization of Lesions: CBCT allows for the accurate identification and measurement of periapical lesions, cysts, and other pathologies, aiding in precise diagnosis and treatment planning.

Assessment of Surgical Outcomes: Postoperative CBCT scans provide a detailed view of the surgical site, allowing the clinician to assess the success of the procedure and detect any potential complications, such as root fractures or persistent infections.

5. Minimally Invasive Techniques:

Modern endodontic microsurgery emphasizes the importance of minimizing trauma to surrounding tissues. By utilizing advanced techniques, such as small incisions, microsurgical instruments, and careful dissection, clinicians can achieve optimal surgical outcomes with reduced tissue damage. The benefits of minimally invasive microsurgery include:

Reduced Postoperative Pain and Swelling: Smaller incisions and minimal soft tissue manipulation lead to less postoperative pain, swelling, and discomfort, which improves the patient's recovery experience.

Faster Healing: Less tissue trauma results in faster healing times and shorter recovery periods. Patients typically experience a quicker return to normal activities, reducing the need for extended time off work or other inconveniences.

Improved Aesthetic Outcomes: Minimal surgical exposure and precision in tissue handling can lead to better cosmetic results, particularly in cases where the surgery is near visible areas, such as the anterior teeth.

6. Enhanced Patient Communication and Treatment Planning:

The modern approach to endodontic microsurgery also includes advancements in patient communication and treatment planning. Digital imaging, 3D modeling, and even virtual reality (VR) have made it easier for patients to understand the procedure, leading to improved patient compliance and satisfaction. Enhanced visualization of the surgical area and the proposed treatment plan also allows for better-informed decision-making, fostering trust and confidence between the clinician and patient.

Conclusion:

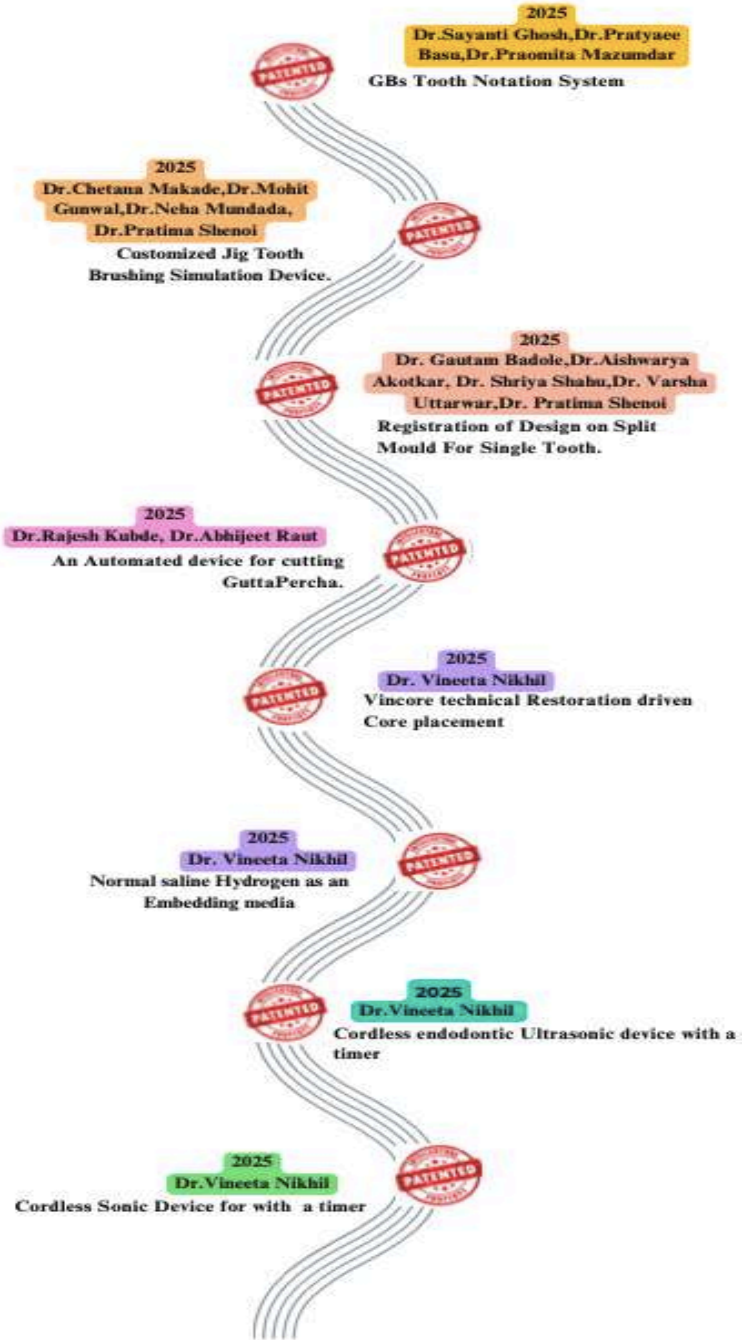
The modern approaches to endodontic microsurgery have transformed the field, providing numerous advantages over traditional methods. Enhanced visualization through surgical microscopes, precision cutting with ultrasonic instruments, biocompatible root-end materials, and advanced imaging techniques such as CBCT have all contributed to improved surgical outcomes. These innovations not only increase the precision and predictability of endodontic microsurgery but also reduce patient morbidity, leading to faster recovery times and improved patient satisfaction. As technology continues to evolve, the future of endodontic microsurgery holds great promise for even more refined techniques and enhanced clinical outcomes.

Spotlight on Indigenous IP

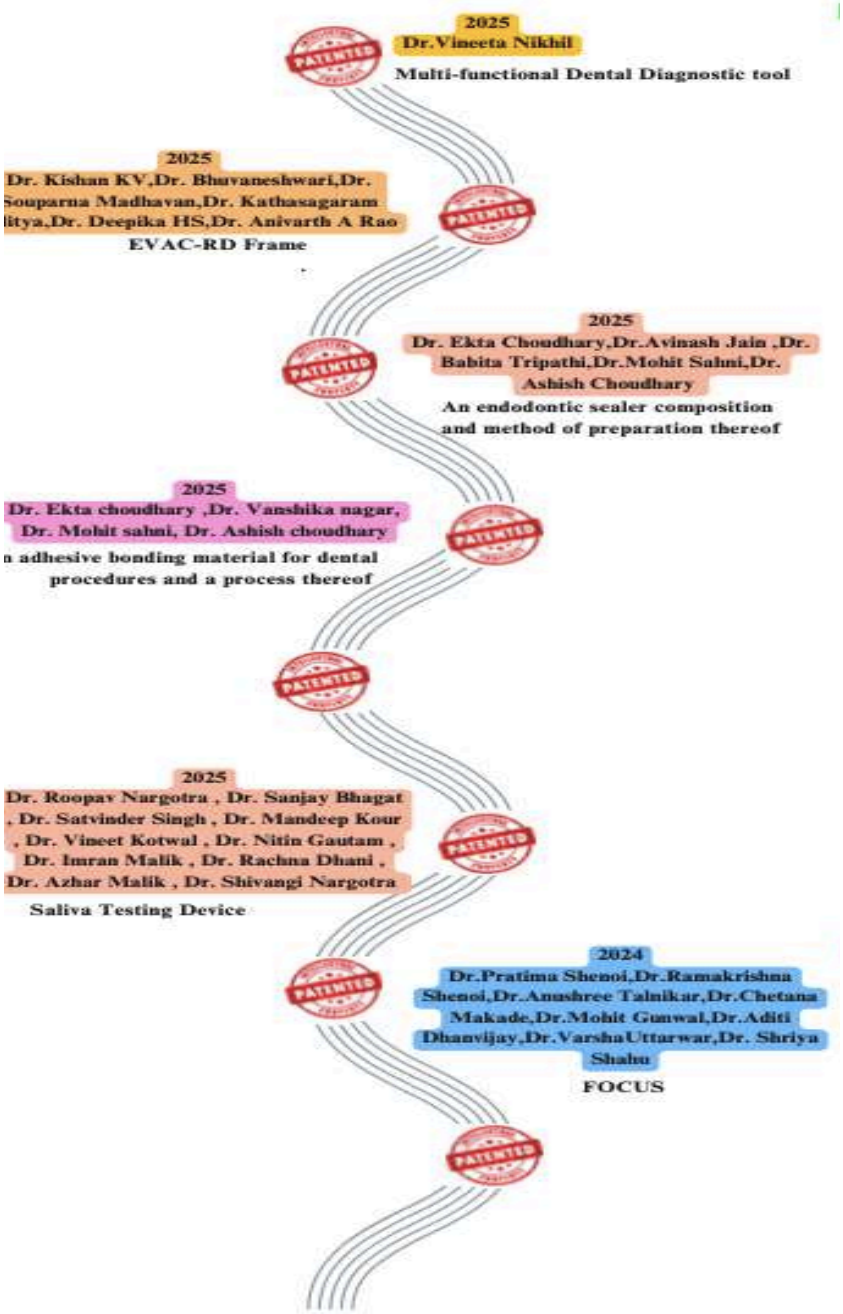
In our ongoing pursuit to highlight innovation and progress within the field of Endodontics, we are excited to introduce the new Patent Section in this issue of the Indian Endodontic Society (IES) Times. This section is dedicated to showcasing recently published patents that are highly relevant to clinical Endodontics, reflecting the creativity and commitment of our community.

We take pride in presenting these contributions, which exemplify the relentless efforts to advance our field through innovative ideas and solutions.

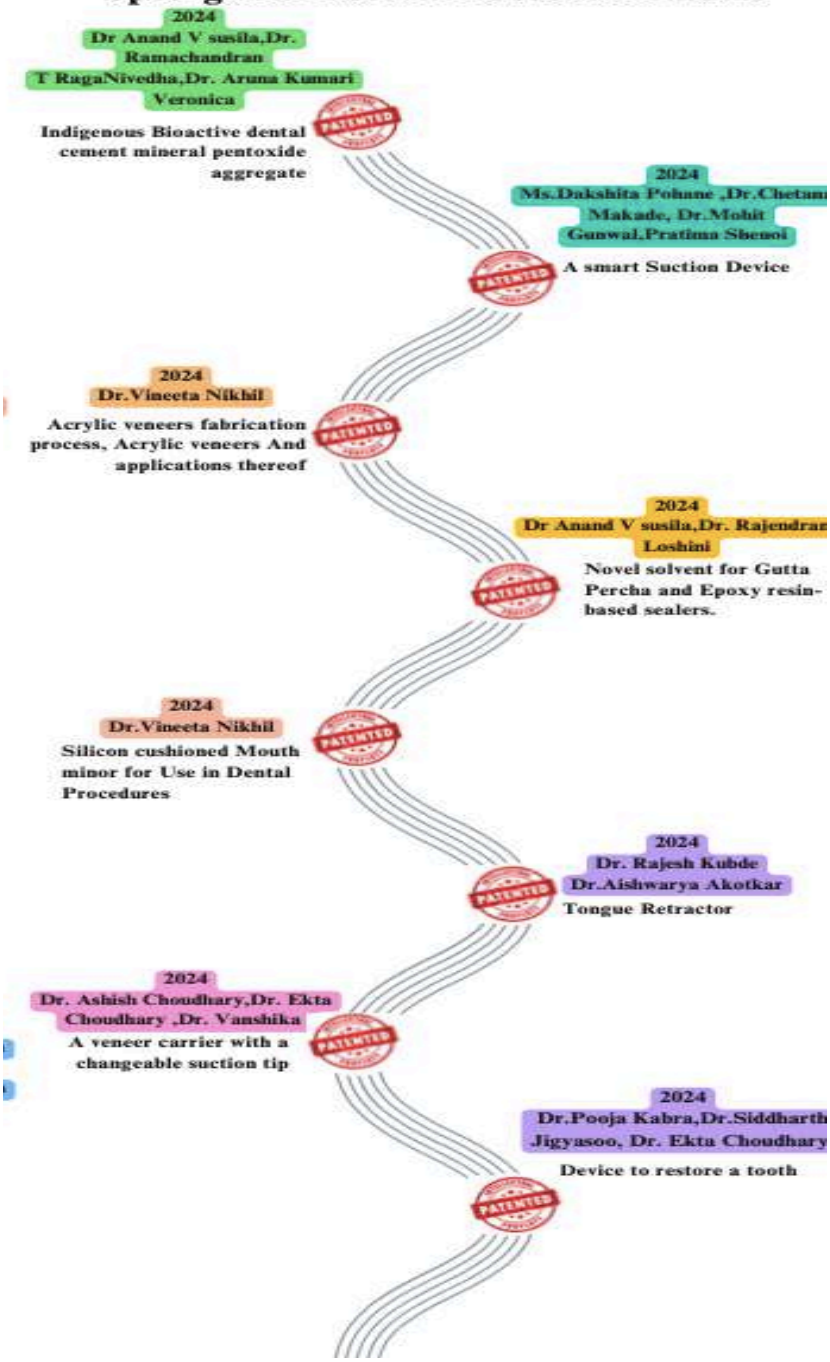
Spotlight on Recent Endodontic Patents



Spotlight on Recent Endodontic Patents



Spotlight on Recent Endodontic Patents



Beyond the borders of the pulp chamber

Miles & Smiles

Miles and Smiles: The Endodontic Marathon

There's a quote well known amongst runners, "When your legs get tired, run with your heart". Something is similar is true with dentistry. The emotional commitment far outweighs the physical exhaustion. And just like dentistry, running is a beautiful combination of scientific preparation and artistic execution.

The long run , the long canal – Both demand heart :

Running and root canals may seem like worlds apart, but at their very core, both are marathons of endurance, precision, and purpose. As an endodontist with a passion for marathon running, I have often felt that the spirit of the long road and the spirit of saving a tooth share the same heartbeat. Just as every marathon begins with the first determined step, every endodontic procedure begins with the first decisive stroke of the file, both requiring patience, discipline, and an unwavering focus on the finish line. Maybe the similarities drew me in. What started as a hobby and has become a passion. Now I'm moonlighting on most days a runner.

From finish lines to root lines- Precision defines me:

In marathon running, success is not about speed alone; it is about rhythm, resilience, and the will to keep moving forward when every muscle aches. In endodontics too, victory is not in the hurried rush of treatment but in the careful shaping, cleaning, and sealing that restores life to a tooth once thought lost. One foot after another, one file after another — endurance and precision go hand in hand. The runner's mantra of "slow and steady wins the race" echoes in the clinician's motto of "thorough and steady saves the case."

Every race tells a story, and so does every root canal. A runner pushes past the wall at the 30th kilometer with grit and courage, while the endodontist pushes past calcified canals, hidden curvatures, and unexpected challenges with skill and persistence. Both celebrate small victories — the runner at each hydration point, the dentist at each confirmed working length — knowing that these milestones bring them closer to the goal. And when the finish line is crossed or the final obturation is placed, the triumph is not just technical, but deeply personal.

Similarity in running and dental practice:

The marathon teaches humility; there are no shortcuts to 42 kilometers. Similarly, endodontics teaches respect for biology; there are no shortcuts to long-term success. You prepare, you train, you understand your limits, and then you push beyond them with knowledge and practice. Just as a runner invests in shoes that carry him through countless miles, an endodontist invests in instruments, magnification, and irrigation systems that carry him through the most challenging cases. In both fields, technology helps, but it is the spirit that defines the outcome.

"Every mile is a smile" is what many runners believe, and in my specialty, I like to think "Every canal is a chance to bring back a smile." Running clears the mind, strengthens the heart, and brings clarity of thought. Endodontics, in its own way, clears infection, strengthens the tooth, and brings clarity to a patient's smile. Both heal — one heals the runner, the other heals the patient.

Importance of consistency and discipline:

When I lace up for a marathon, I feel the same surge of focus as when I do in my loupes. The start gun is like the first radiograph, setting the tone. The cheering crowds are like supportive colleagues, guiding me on. The inevitable wall during the run is like the moment of a tricky ledge or a missed canal, testing my patience. But the drive to finish, to restore, to conquer, is what unites the runner and the endodontist in me.

Endurance on the track, excellence in the operatory:

As I cross finish lines across cities, I am reminded that endodontics too has its finish lines — a pain-free patient, a restored tooth, a grateful smile. Both journeys are long, but both are worth every ounce of effort. Because in the end, whether on the track or in the operatory, what matters is endurance, precision, and purpose.

So, I carry this mantra with me in both shoes and scrubs:

“From start line to finish line, from access to obturation — it’s all about the journey.”

The finish line of a marathon is painted on the road, but the finish line of endodontics is painted on a patient’s face, in the form of relief, gratitude, and a renewed smile. That is the true victory. And just like no two races are the same, no two root canals are the same — each teaches something new, each makes me stronger, each makes me better.

Marathons build endurance, endodontics builds trust:

Running has given me stamina; endodontics has given me purpose. Together, they define who I am — a marathoner of miles and a marathoner of smiles. My soulful connection for marathon as endodontist is as a endodontist I increases the longevity of the tooth , as a runner I’m increasing the longevity of the life , most important is staying healthy no matter what the profession is! To Lead a healthy life , ur passion should be healthy! Love your life , life loves u back ! And as long as there are roads to run and canals to treat, the marathon continues…..

Dr. Pradyumna Misra

BDS; MDS

Head of Department

Saraswati Dental College & Hospital, Lucknow

Dr. Tushita Garg

PG Student

Subharti Dental College and Hospital, Meerut

Roots of Resilience

In our cubicles with dreams in sight,
We step into a world unseen,
Through roots and nerves and curing light,
Where incredible skills bloom between.

Some lessons come through sleepless nights,
Some root outlines we can't trace.
Some days are dim, the pressure tight,
With every mistake and failed case.

With cautious hands and minds open wide,
Where patience guides the skills we show.
Each case becomes a silent guide,
Which helps our precision grow.

Beneath the loops, behind the mask,
Is the courage that dares to hide.
In every tooth, a sacred task,
With our mentors by our side.

They see us stumble, watch us rise,
They stand with calm, unwavering grace.
They catch our mistakes with experienced eyes,
They guide us at our own pace.

So harsh the path, yet bright the prize,
Every person along the way, a special part.
A gift that hides in sacrifice,
And lessons carved within the heart.

Dr. Anuhya Samala

PG Student

Kamineni Institute of Dental Sciences, Telangana

"The Root of Every Smile"

- Ode to Endodontics

In caverns deep where roots reside,
A silent war we must confide.
When pulp is flamed and nerves do scream,
Endodontics steps into the dream.

With files fine and steady hand,
We navigate that twisted land.
Through narrow paths, both dark and tight,
We chase infection out of sight.

Rubber dams, our trusted shield,
In sterile zones, the truth revealed.
We cleanse with wash, we shape with grace,
To bring a smile to a tear-stained face.

Apex locators lead the way,
To guide us where the tissues lay.
With cones of gutta, snug and warm,
We seal the tooth and calm the storm.

No crown of gold or dazzling gem
Can match the root that we defend.
For though unseen, it bears the weight
Of every bite we masticate.

So here's to drills and files that hum,
To aching teeth we've made go numb.
To pulps relieved, to lives restored—
Endodontists, with pride, adored.

Let others crown and brace and mold,
We work where stories go untold.
In chambers small, with purpose grand,
We heal the tooth with heart and hand.

Post graduate's ingenuity

Dr. Anshuman Rai

PG Student

King George Medical University, Lucknow

Advancements in Scaffolds for Pulp–Dentine Regeneration

Regenerative endodontics aims to restore the biological and functional integrity of the pulp–dentine complex. Scaffolds are central to this approach, providing a 3D framework for stem cell adhesion, proliferation, and differentiation, while supporting vascular and neural ingrowth. An ideal scaffold should be biocompatible, bioactive, injectable, biodegradable, and capable of delivering growth factors or drugs. [1,2]

Natural and ECM-Based Scaffolds

Natural polymers like collagen, gelatin, and hyaluronic acid mimic native ECM and support favorable pulp responses. Photocross linkable gelatin–dentin hydrogels promoted dentin bridge formation in vivo. [5] Decellularized ECM scaffolds, including bovine pulp hydrogels and salivary gland scaffolds, preserve bioactive cues that enhance odontogenic differentiation, though standardization remains a challenge. [7,11]

Synthetic and Hybrid Polymers

Synthetic polymers such as PLA, PCL, and PLGA offer tunable degradation but limited bioactivity. Hybrid systems, like bovine dentin collagen/PLA composites, improve odontogenic potential. [9] Electrospun nanofibrous scaffolds, engineered for drug release, have shown enhanced stem cell differentiation, e.g., tideglusib-loaded nanofibers promoting odontogenesis. [10]

Inorganic and Nanoparticle Systems

Inorganic materials such as mesoporous silica nanoparticles (MSNs) and bioactive glass enhance scaffold bioactivity and serve as ion/drug carriers. MSN scaffolds supported pulp healing and root maturation in dog models. [6] Oxygen-releasing nanofibers further improved stem cell survival under hypoxia. [8]

Autologous Platelet-Derived Scaffolds

Platelet concentrates, including PRF and CGF, provide a fibrin matrix with growth factors, promoting angiogenesis and root maturation. Clinical studies confirm their regenerative benefits but note variability and weak mechanical properties. [4]

Biofunctionalization Strategies

Biofunctionalization allows scaffolds to deliver bioactive molecules. Growth factors like VEGF and BMPs support angiogenesis and odontogenesis, but stability limits clinical use [2]. Small molecules (e.g., tideglusib) and oxygen-releasing systems offer practical alternatives.[8,10] Autologous platelet derivatives also act as natural growth factor reservoirs [4].

In Vitro and In Vivo Evidence

Studies using DPSCs and SCAP confirm that ECM-based hydrogels, nanofibers, and nanoparticle scaffolds enhance odontogenic differentiation and mineralization. [1,7,9] In vivo, gelatin hydrogels improved pulp tissue responses [5], MSN scaffolds promoted root maturation [6], and PRF/CGF yielded clinical success in regenerative endodontics. [4]

Challenges and Future Directions

Key challenges include lack of standardization in natural scaffolds, limited vascularization, and infection control. Injectable photocrosslinkable hydrogels and multifunctional hybrids combining ECM cues with synthetic tunability hold promise. Future success depends on clinician-friendly designs and validation through large-scale clinical trials. [2,12]

Conclusion

Scaffold development in pulp–dentine regeneration has advanced from simple matrices to multifunctional systems integrating nanotechnology, ECM cues, and bioactive molecules. Despite challenges, innovations such as gelatin hydrogels, nanofiber scaffolds, MSNs, and platelet derivatives demonstrate strong translational potential. [1,12]

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Nanoparticles in Endodontic Disinfection: A Review

Endodontic therapy focuses on eliminating infection from the root canal system and preserving natural dentition. Conventional irrigation and instrumentation often fail to completely eradicate biofilms in complex canal anatomies such as isthmuses and lateral canals [(1)]. This limitation has led to the exploration of nanotechnology in dentistry. Nanoparticles (1–100 nm) exhibit high surface area, reactivity, and the ability to penetrate dentinal tubules, making them promising tools for enhanced antimicrobial action and regenerative approaches [(2)].

Nanoparticles in Root Canal Disinfection

Microbial biofilms, particularly *Enterococcus faecalis*, are central to endodontic treatment failure. Silver nanoparticles (AgNPs) have been extensively studied for their broad-spectrum antimicrobial effects, disrupting membranes, generating reactive oxygen species (ROS), and interfering with DNA [3,4]. Chitosan nanoparticles, derived from natural polysaccharides, offer biodegradability, substantivity, and chelating action, improving dentin disinfection [5]. Zinc oxide nanoparticles (ZnO NPs) also demonstrate antibacterial effects via ROS generation and have been evaluated in intracanal medicaments [6].

Nano-Enhanced Irrigants and Medicaments

Conventional irrigants like NaOCl and CHX have limitations in tubule penetration [1]. Nano-silver and nano-CHX irrigants improve penetration and substantivity, extending antimicrobial action [7]. Triple antibiotic paste has also been modified with nanoparticles, enhancing drug delivery while reducing cytotoxicity [2].

Nanoparticles in Obturation and Sealers

Incorporating nanoparticles into sealers enhances flowability, sealing, and antimicrobial properties. Bioceramic-based sealers with nanoparticles exhibit superior sealing and bioactivity [8]. Nano-hydroxyapatite improves the bond strength of obturation materials and promotes dentin remineralization [9].

Applications in Regenerative Endodontics

Nanotechnology supports regenerative endodontics by providing nanofibrous scaffolds that mimic the extracellular matrix and promote stem cell growth. Nanoparticles also enable sustained delivery of bioactive molecules, including BMPs and VEGF, improving tissue regeneration [2,10].

Challenges and Future Perspectives

Despite promising results, concerns remain regarding cytotoxicity, lack of standardized nanoparticle formulations, and insufficient long-term clinical trials [6]. Future work should focus on multifunctional nanoparticles that combine disinfection, regeneration, and improved sealing, supported by standardized protocols and clinical validation [2,10].

Conclusion

Nanotechnology offers innovative solutions to persistent endodontic challenges by improving disinfection, enhancing material properties, and supporting regeneration. While barriers to clinical application remain, ongoing research suggests nanoparticles could revolutionize endodontic practice.

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What next?

This Congress will feature a cutting-edge scientific programme, offering a wealth of continuing education (CE) accredited sessions and engaging interactive forums on a range of dentistry-related topics.

Moreover, attendees will get the opportunity to discover the latest innovations in the field at the expansive industry exhibition.

15th IFEA World Endodontic Congress is being held in conjunction with the Australian Society of Endodontology (ASE). The Congress will be held in Sydney from August 27 to 30, 2026.

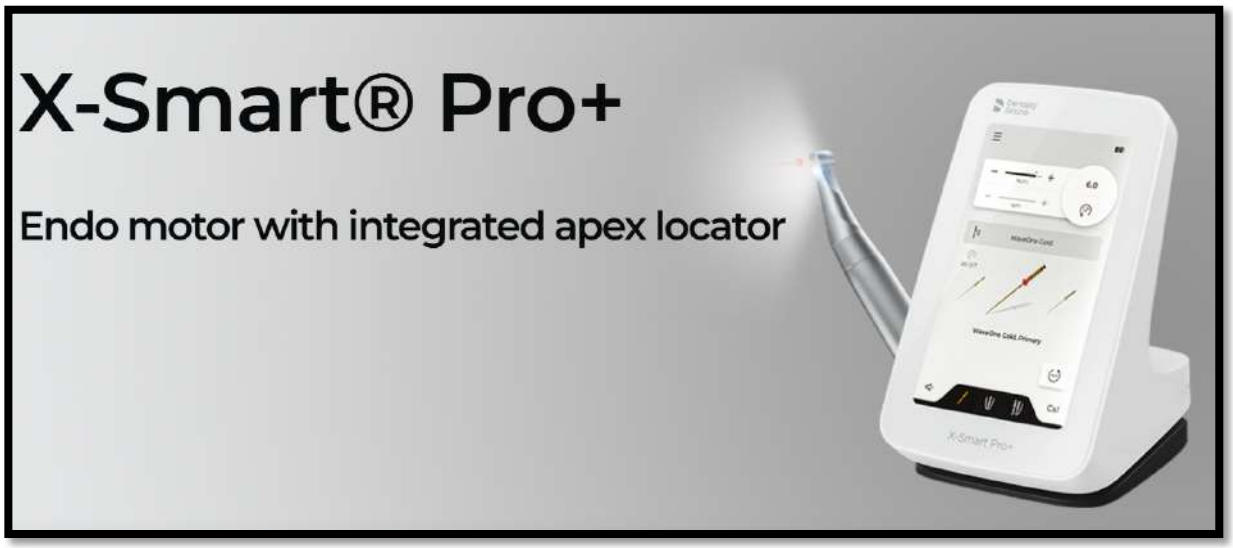
The Congress will be scientifically compelling and multidisciplinary, building on the high standards of the past. The program is being developed with the International Scientific Advisory Committee and will comprise of a diverse portfolio of content from industry experts.

Mark your calendar for the AAE's 2026 Annual Meeting, taking place April 15–18 at the Salt Palace Convention Center in Salt Lake City, Utah. More details are available on https://www.aae.org/specialty/education-events/aae-annual-meeting/

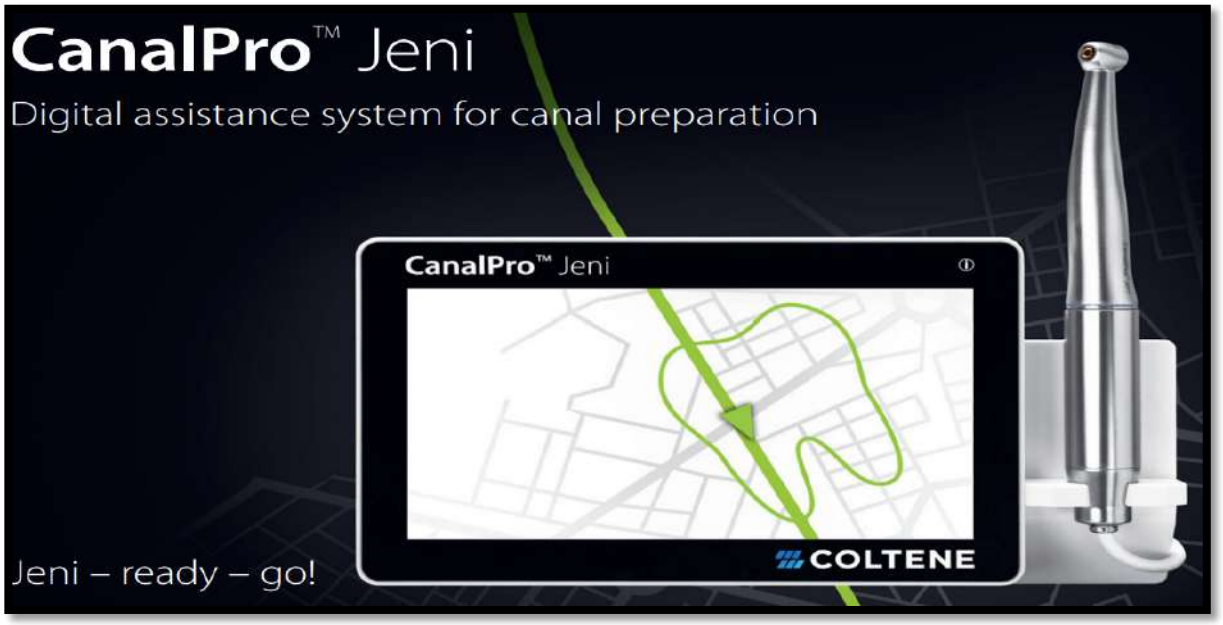
The **33rd National Congress of the Indian Endodontic Society (IESCON 2025)** is scheduled from **31st October to 2nd November,2025 in Goa.** The event will feature pre-conference courses, paper & poster sessions, keynote lectures, case contests, and awards, aiming to bring together endodontists, researchers, and postgraduate students for knowledge exchange and professional growth.

IESCON will feature a stellar lineup of international and national speakers, including Dr. **Matthias Zehnder** on disinfection, **Dr. Josette Camilleri (UK)** on bioceramics materials, and **Dr. Marco Ferrari** with clinical insights on restoration of endodontically treated teeth. **Dr. Rui Pereira da Costa (Portugal)** and **Dr. Talal Al-Nahlawi (Syria)** will share global perspectives on Perforation repair and Surgical/Non-surgical Endodontics, while **Dr. Filippo Cardinali** will focus on Ledge prevention & management. Adding strength to the program, **Dr. Prasanna Neelakantan** will demystify concepts of root canal disinfection, alongside Indian speakers **Dr. Abarajithan Mohan** and **Dr. Isha Sabhlok**, representing homegrown expertise and emerging voices. Together, the sessions promise a rich blend of science, innovation, and clinical relevance.

The Debutante



The **X-Smart Pro+** from Dentsply Sirona is an advanced endodontic motor with an integrated apex locator, designed to streamline root canal treatments. It supports both continuous rotation and reciprocation, with preset programs along with customizable sequences. Its *Dynamic Accuracy™* technology provides precise working length control during shaping, while a mini contra-angle with LED light ensures excellent visibility and access. With a wide torque (up to 7.5 N·cm) and speed range (100–3,000 rpm), ergonomic touchscreen interface, autoclavable components, and upgradeable firmware, the X-Smart Pro+ offers efficiency, safety, and adaptability, making it a comprehensive solution for modern endodontic practice. https://www.dentsplysirona.com/en-in/discover/discover-by-brand/x-smart-pro-plus.html.



The CanalPro Jeni is a German-built endodontic motor with a digital assistance system (Jeni-Move) that guides canal preparation step by step, integrating real-time measurements and feedback. It automatically adapts speed, torque, and motion based on file stress and anatomy while allowing the user to work from coronal to apical with light, steady pressure. It has an integrated apex locator, audible prompts for irrigation and file fatigue, pre-programmed settings for common NiTi file systems (e.g. HyFlex, MicroMega), and a 7" touch display with Bluetooth footswitch for enhanced control and usability.

https://products.coltene.com/EN/IN/media/DOC_BRO_60024298-EN-11-20-CanalPro-Jeni-Broschuere-210x742-5_IND.pdf?sprache=EN

Biodentine XP is an upgraded dentine restoration material designed to function both as a pulp therapeutic and dentin substitute from crown to root.

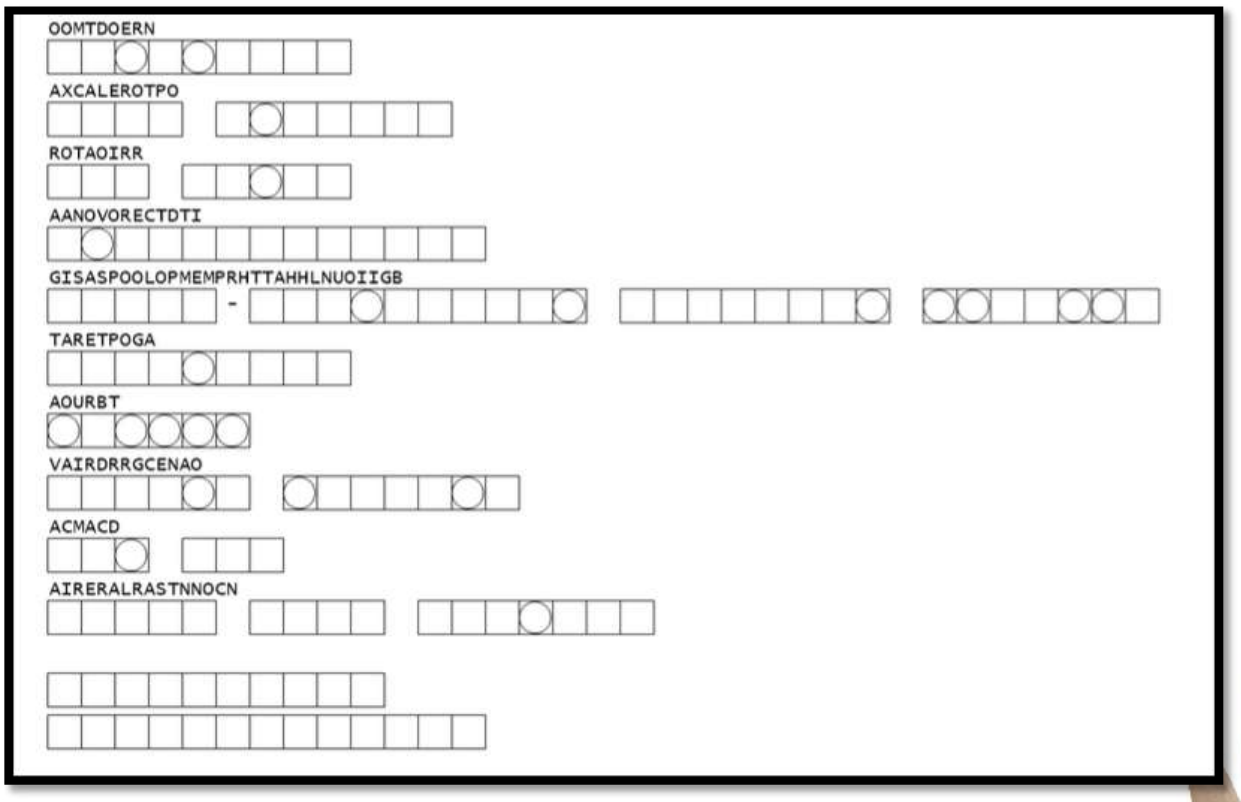
Key improvements over earlier versions include an **all-in-one cartridge** system with powder + liquid pre-loaded, a specialized mixer for consistent homogeneous mixing in about 30 seconds, and an applicator gun with a bendable tip for easier, direct placement. It offers two cartridge sizes (XP 200 and XP 500) to match procedural volume, reducing waste. Biodentine XP is indicated for a wide variety of uses: deep caries, pulp capping (direct & indirect), pulpotomies (reversible & irreversible), perforation repairs, resorptions, apexification, and surgical root-end fillings.

https://www.septodontusa.com/product/dentin-restoration-biodentine-xp/

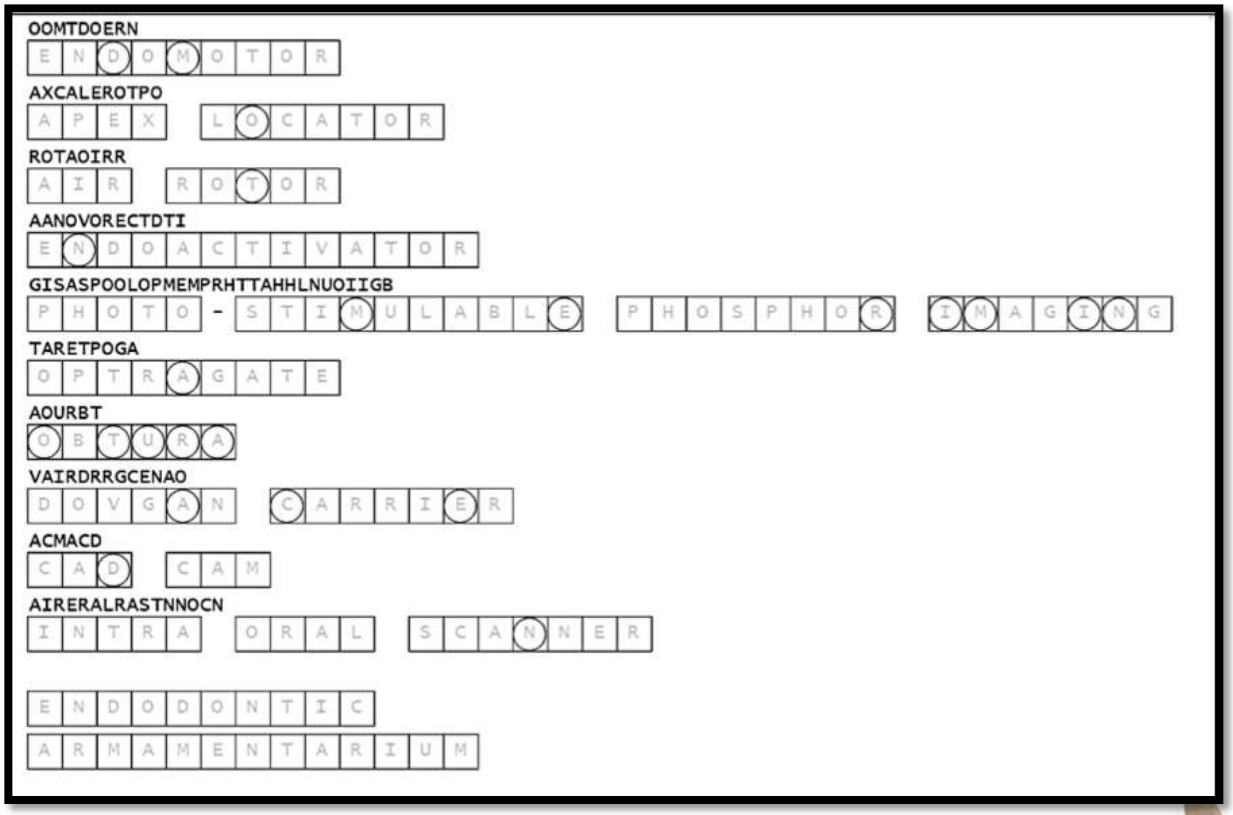
BufferPro offers an elegant, one-step solution for buffering dental local anesthetics. It dispenses 0.1mL of sodium bicarbonate into a dental anesthetic cartridge to raise the pH of the anesthetic solution close to physiologic levels. BufferPro is a single-use, sterile packaged, self-contained capsule with no measuring, mixing, or additional accessories.

ENDO MIND BENDER

"A puzzle designed to reinforce and assess knowledge of essential endodontic instruments."



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

- H.E. Luccock

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