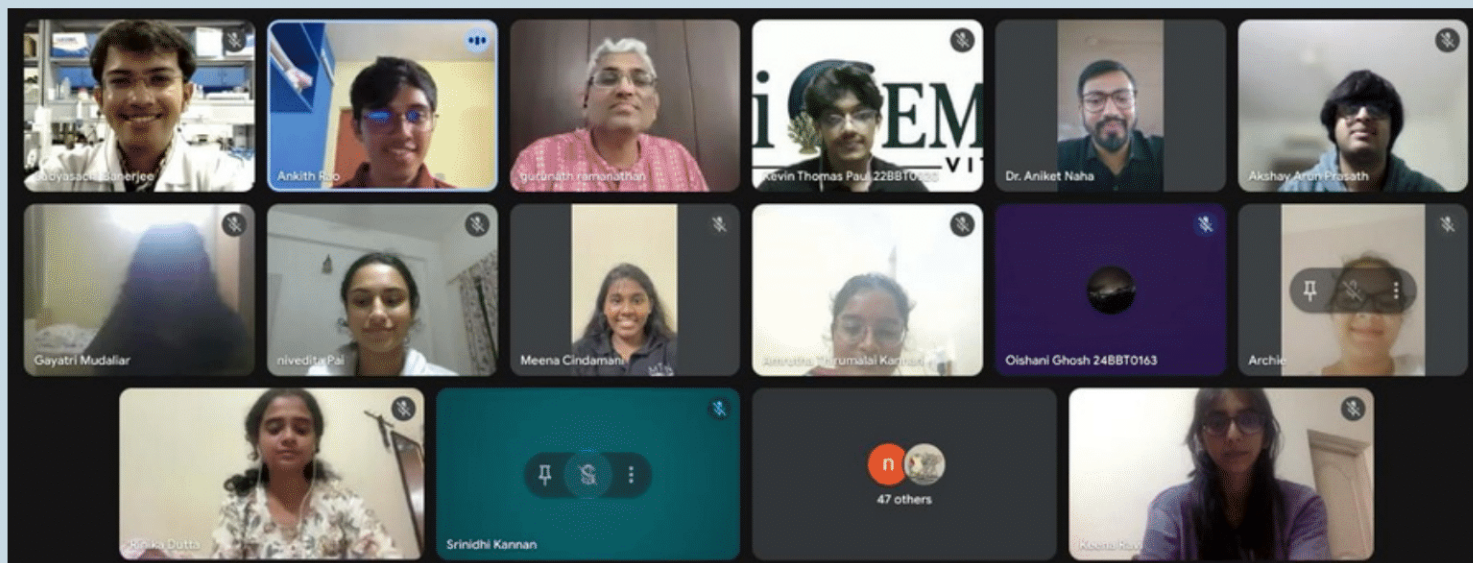


## PRC Scientist Invited as Guest Lecturer at VIT Career Guidance Session

Dr. Aniket Naha, Scientist, PRC, served as a Guest Lecturer for the career guidance session “Biotech Compass: Navigate Your Future” organized by the International iGEM Club at Vellore Institute of Technology (VIT), Vellore, on 21st September 2025.

He shared the platform with Prof. Dr. Gurunath Ramanathan from MIT, addressing undergraduate and postgraduate students along with their parents on career pathways and opportunities after graduation.

In his talk, Dr. Aniket emphasized the scope of dissertation projects, internships, and training opportunities, and highlighted the facilities available at Pushpagiri Research Centre for conducting in-vivo animal experiments, encouraging students to explore advanced research opportunities.



## Institutional Review Board Meeting



The Institutional Review Board (IRB) meeting was held on 16th September 2025 at the Conference Hall, Pushpagiri Research Centre. A total of 12 research proposals were reviewed, including submissions from the Pushpagiri group of institutions as well as from other institutions having active MoUs with PRC.



# Announcements

## Call for Chapters: Bioglass and Its Applications in Tissue Engineering and Dentistry



Elsevier S&T Books • Book proposal form

### Working title

Titles and subtitles should be focused to include key terms that readers would use if searching for information on this topic

**Bioglass and Its Applications in Tissue Engineering and Dentistry**

### Keywords

Include key terms (not already included in the title/subtitle) that readers would use if searching for information on this topic

biomaterial, nano-engineered, scaffolds, tissue engineering, dental implants, regenerative medicine, biocompatibility

We are pleased to announce the forthcoming edited book titled “Bioglass and Its Applications in Tissue Engineering and Dentistry”, to be published by Elsevier. This book will be an invaluable reference for university professors, researchers, postgraduate and undergraduate students, and scientists working in materials science, biosciences, dentistry, medical science, applied chemistry, applied physics, and nanotechnology.

The editorial team includes:

- Prof. Sabu Thomas, IIUCNN, Mahatma Gandhi University
- Dr. Fernando Gomes, Full Professor, Universidade Federal do Rio de Janeiro (UFRJ), Visiting Associate Professor, Florida International University
- Dr. Nebu George Thomas, Professor & Scientist, PRC
- Dr. Neethu Ninan, Scientist
- Dr. Raneesh Balakrishnan, Assistant Professor, Department of Physics, Catholicate College

The book will comprehensively explore Bioglass, a novel biomaterial, covering its synthesis, properties, biocompatibility, and clinical applications in tissue engineering and dentistry. It will also address emerging areas such as AI-assisted research, toxicology, sustainability, and industrial applications.

Proposed Chapters include:

1. Bioglass: An Outlook on the Past, Present and Future
2. The Science Behind Bioglass
3. Introduction to Bioglass Types
4. AI-Assisted Current Trends and Advances in Bioglass Research
5. Bioglass Synthesis: Principles and Overview (including AI)
6. Characterisation of Bioglass: Methods and Insights with Application of AI
7. Bioglass in Dentistry: Transforming Oral Health Care
8. Role of Bioglass in Tissue Engineering Applications
9. Emerging Roles of Bioglass as Therapeutics in Regenerative Medicine and Dentistry
10. Toxicology and Biocompatibility: Safety Considerations of Bioglass
11. Bioglass Products and Clinical Trials
12. Environmental Impact and Sustainability of Bioglass Production

**Contributions are invited from interested faculty and researchers for the above chapters or related areas.**

For expressions of interest and further details, please contact:

Dr. Nebu George Thomas

Professor & Scientist, Pushpagiri Research Centre

[nebugt@gmail.com](mailto:nebugt@gmail.com)

## 6th JBI-Accredited CS RTP Underway



Pushpagiri Centre for Evidence  
Based Practice (PCEBP)  
A JBI Centre of Excellence

JBI ACCREDITED  
COMPREHENSIVE SYSTEMATIC REVIEW  
TRAINING PROGRAM (CS RTP)

The 6th Comprehensive Systematic Review Training Program (CS RTP), accredited by JBI, Adelaide, Australia, commenced on 24th September 2025 at the Pushpagiri College of Dental Sciences, conducted in hybrid mode.

- Module 1: Introduction to Evidence-Based Healthcare & Systematic Reviews was successfully completed on 24.09.2025.
- Module 2: Conducting Systematic Reviews of Quantitative Evidence is currently in progress (25.09.2025 – 26.09.2025).
- Module 3: Systematic Reviews of Qualitative Evidence is scheduled for 29.09.2025 – 30.09.2025.

The sessions are facilitated by Sr. Mary Jyothi OSS, M.Sc (N), M.Phil, Vice Principal, Pushpagiri College of Nursing, and a JBI-accredited trainer, who serves as the resource person for the program.

This flagship initiative of the Pushpagiri Centre for Evidence-Based Practice (PCEBP) – A JBI Centre of Excellence continues to equip healthcare professionals and researchers with the skills to conduct high-quality systematic reviews, thereby strengthening evidence-based practice across disciplines.

## PRC Faculty Attend GCP and Regulatory Training



Faculty members from Pushpagiri Research Centre participated in the training program on “GCP and Regulatory Requirements for Clinical Research”, organized by the Indian Society for Clinical Research (ISCR) in collaboration with Pushpagiri Institute of Medical Sciences & Research Centre on 11th September 2025 at Thiruvalla.

The training was attended by Dr. Saumya R.S., Dr. Ajay Krishnan U, and Dr. Ampadi A N equipping them with updated knowledge on international standards and regulatory requirements in clinical research.

# Publications:

## Research Article:

1. Naik S, Vellappally S, Alateek M, Alrayeres YF, Kheraif AAAA, Alnassar TM, Thomas NG et al. Patients' Acceptance and Intentions on Using Artificial Intelligence in Dental Diagnosis: Insights From Unified Theory of Acceptance and Use of Technology 2 Model. *Int Dent J.* 2025 Sep 6;75(6):103893

**International Dental Journal**  
Volume 75, Issue 6, December 2025, 103893

Scientific Research Report

**Patients' Acceptance and Intentions on Using Artificial Intelligence in Dental Diagnosis: Insights From Unified Theory of Acceptance and Use of Technology 2 Model**

Sachin Naik<sup>a</sup>, Sajith Vellappally<sup>b</sup>, Mohammed Alateek<sup>c</sup>, Yasser Fahad Alrayeres<sup>c</sup>, Abdul Aziz Abdullah Al Kheraif<sup>a</sup>, Talal Mughailath Alnassar<sup>d</sup>, Ziyad Mohammed Alsultan<sup>e</sup>, Nebu George Thomas<sup>e</sup>, Aneesh Chopra<sup>f,g\*</sup>

<sup>a</sup> Dental Biomaterials Research Chair, Dental Health Department, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia  
<sup>b</sup> Dental Health Department, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia  
<sup>c</sup> Dental University Hospital, King Saud University, Medical City, Riyadh, Saudi Arabia  
<sup>d</sup> Department of Prosthetic Dental Sciences, College of Dentistry, King Saud University, Riyadh 11545, Saudi Arabia  
<sup>e</sup> Department of Periodontology, Pushpagiri College of Dental Sciences, Thiruvalla, Kerala, India  
<sup>f</sup> Department of Periodontology, Oral Medicine and Oral Surgery, Institute for Dental and Craniofacial Sciences, Charité –University Medicine Berlin, Corporate member of Freie Universität Berlin, Humboldt –Universität zu Berlin, and Berlin Institute of Health, Berlin, Germany  
<sup>g</sup> Department of Conservative Dentistry and Periodontology, Medizinische Hochschule Brandenburg (MHB) Theodor Fontane, Brandenburg an der Havel, Germany

**ARTICLE INFO**

Article history:  
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**Key words:**  
Artificial intelligence  
Dental diagnosis  
UTAUT2

**ABSTRACT**

**Introduction and aims:** Artificial intelligence (AI) is transforming dental care by enhancing diagnostic accuracy, efficiency, and patient experience. This study aimed to assess dental patients' acceptance, perceptions, and concerns regarding AI-powered diagnosis using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) framework through structural equation modelling (SEM).


**Methods:** A cross-sectional study was conducted among dental patients at King Saud University Dental Hospital, Riyadh. Data were collected using a structured questionnaire based on the UTAUT2 framework. Confirmatory factor analysis was performed to assess the validity and reliability of the measurement model. SEM was then utilized to evaluate the relationships between UTAUT2 constructs and patients' behavioural intention toward AI-powered dental diagnosis.

2.Ashraf PM, Vrindha KR, Binsi PK, Thomas NG. Nano carbon dot-collagen peptide– Hydroxyapatite composite coating for bone tissue regeneration. *Next Materials*. 2025 Jul 1; 8:100914.

Next Materials 8 (2025) 100914


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Contents lists available at [ScienceDirect](https://www.sciencedirect.com)



## Next Materials

journal homepage: [www.sciencedirect.com/journal/next-materials](https://www.sciencedirect.com/journal/next-materials)



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Research article

### Nano carbon dot-collagen peptide – Hydroxyapatite composite coating for bone tissue regeneration

P.Muhammed Ashraf<sup>a,\*</sup>, K.R. Vrindha<sup>a,2</sup>, P.K. Binsi<sup>a,3</sup>, Nebu George Thomas<sup>b,4</sup>

<sup>a</sup> ICAR Central Institute of Fisheries Technology, Cochin 682 029, India  
<sup>b</sup> Pushpagiri College of Dental Sciences, Thiruvalla 689 107, India

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**ARTICLE INFO**

**Keywords:**  
Osseointegration  
Bone implants  
Nanocomposite  
Fish waste  
Carbon dots  
Collagen peptides  
Hydroxyapatite

**ABSTRACT**

Biological derivatives are the preferred coating materials for enhancing osseointegration in bone implants. The present study aimed to develop a nanocomposite from fish waste, comprising of carbon dots (CD), collagen peptides (CP), and natural hydroxyapatite (HAP), to serve as a coating material for titanium implants, so as to facilitate rapid tissue regeneration. The nanocomposite (CD-CP-HAP) was synthesized using a two-step protocol. Fourier Transform Infrared (FTIR) and UV-Visible spectroscopic studies confirmed the interaction between carbon dots (CD) and collagen peptides (CP) through conjugated C=C and OH–NH hydrogen bonding. Additionally, the phosphate (PO<sub>4</sub><sup>3-</sup>) group of hydroxyapatite (HAP) interacted with the NH and OH functional groups of CD and CP, as evidenced by the presence of OH absorption in multiple environments. The titanium strips coated with the nanocomposite demonstrated a significant increase in polarization resistance, highlighting their potential for bone regeneration applications. The cell toxicity assay indicated that the composite is biocompatible, and has the potential to be used as a coating material for bone implants to enhance bone tissue regeneration.

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3.Kavya S, George VT, Thomas NG, Rakesh M, Lekshmi M, Appukuttan A, Prabhu VV. Salivary Cystatin C as a Potential Biomarker in Stage III/IV Periodontitis: A Comparative Study. *Journal of International Oral Health*. 2025 Jul 1;17(4):316–22.

Original Research

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## Salivary Cystatin C as a Potential Biomarker in Stage III/IV Periodontitis: A Comparative Study

S. Kavya<sup>1</sup>, V. Thomas George<sup>1</sup>, Nebu George Thomas<sup>1</sup>, M. Rakesh<sup>2</sup>, M. Lekshmi<sup>1</sup>, Anjana Appukuttan<sup>1</sup>, V. Varsha Prabhu<sup>1</sup>

<sup>1</sup>Department of Periodontology, Pushpagiri College of Dental Sciences, Thiruvalla, Kerala, Affiliated to Kerala University of Health Sciences, Thrissur <sup>2</sup>Department of Community Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, Tamil Nadu, India

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**Abstract**

**Aim:** Periodontitis is a chronic, multifactorial inflammatory disease characterized by progressive destruction of the supporting periodontal tissues. Early identification of disease activity and severity remains a clinical challenge. Salivary biomarkers offer promise as noninvasive tools for diagnosis and monitoring. Cystatin C, a cysteine protease inhibitor, plays a regulatory role in tissue proteolysis and inflammation, but its salivary expression in advanced periodontal disease remains underexplored. The aim of the study was to quantitatively assess and compare salivary cystatin C levels in periodontally healthy individuals and patients diagnosed with stage III/IV periodontitis and to evaluate its correlation with key clinical parameters. **Materials and Methods:** This cross-sectional analytical study included 36 participants aged 30–65 years, equally divided into healthy controls ( $n = 18$ ) and stage III/IV periodontitis patients ( $n = 18$ ), classified per the 2017 World Workshop criteria. Standardized periodontal clinical parameters—plaque index (PI), gingival index (GI), probing pocket depth (PPD), and clinical attachment loss (CAL)—were recorded by a calibrated, blinded examiner. Unstimulated whole saliva samples were collected under controlled conditions and analyzed for cystatin C using a validated enzyme-linked immunosorbent assay (ELISA) protocol. Statistical analysis included independent  $t$  tests, Pearson's correlation, Bonferroni correction, multivariate linear regression, and analysis of covariance (ANCOVA) to adjust for confounders. **Results:** Salivary cystatin C levels were significantly elevated in the periodontitis group ( $3.16 \pm 0.65$  ng/mL) compared to healthy controls ( $0.78 \pm 0.23$  ng/mL;  $P < 0.01$ ). A large effect size (Cohen's  $d = 4.88$ ) underscored the clinical relevance of this difference. Cystatin C positively correlated with CAL ( $r = 0.685$ ,  $P = 0.02$ ) and PPD ( $r = 0.455$ ,  $P = 0.05$ ), but not with PI or GI. Age was an independent predictor of cystatin C levels ( $\beta = 0.05$ ,  $P = 0.02$ ); however, ANCOVA confirmed the intergroup difference remained significant after adjusting for age ( $P < 0.01$ ). **Conclusion:** Salivary cystatin C demonstrates strong potential as a noninvasive biomarker for assessing periodontal disease severity, particularly reflecting deep tissue destruction rather than superficial inflammation. Its significant association with CAL supports its utility in disease monitoring. Larger longitudinal and multi-marker studies are warranted to validate its diagnostic accuracy and establish clinical thresholds.

**Keywords:** Clinical Attachment Loss, Cystatin C, ELISA, Noninvasive Diagnosis, Periodontitis, Salivary Biomarkers

4. George EA, Naha A, Ramaiah S. Novel antimicrobial peptide HFIAP-1 mutant as a  $\beta$ -lactamase inhibitor against extended-spectrum  $\beta$ -lactamases of *Escherichia coli*: a comprehensive in-silico approach. Arch Microbiol [Internet]. 2025 Sep 24 [cited 2025 Sep 24];207(11):279. Available from: <https://doi.org/10.1007/s00203-025-04483-0>

Archives of Microbiology (2025) 207:279  
<https://doi.org/10.1007/s00203-025-04483-0>

ORIGINAL PAPER

Novel antimicrobial peptide HFIAP-1 mutant as a  $\beta$ -lactamase inhibitor against extended-spectrum  $\beta$ -lactamases of *Escherichia coli*: a comprehensive in-silico approach


Elizabeth Annie George<sup>1,2</sup> · Aniket Naha<sup>1</sup> · Sudha Ramaiah<sup>1,2</sup>

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**Abstract**  
Extended-spectrum  $\beta$ -lactamases in *Escherichia coli* poses a significant threat for clinicians in tertiary healthcare settings, rendering treatments ineffective with newer  $\beta$ -lactam- $\beta$ -lactamase inhibitors combinations. To overcome this, the present study was conducted to potential  $\beta$ -lactamase inhibitors, from a library of antimicrobial peptide mutants with enhanced antibacterial potency (~7–16%) as compared to their parent peptides. The study screened five peptides and their mutants based on physicochemical, pharmaco-immunogenic properties through comprehensive knowledge-based and machine-learning algorithms. Molecular docking analyses revealed HFIAP-1\_M5 (L33K-W7C-N34C) as the potential inhibitor candidate, that predicted to inhibit~82% of all the studied ESBLs (Class A–D) targets as analysed from the intermolecular interaction profiling. HFIAP-1\_M5 exhibited enhanced binding affinities (~0.2–12.0%) than the parent peptides upon forming hydrogen bonds, van-der Waals interactions and salt bridges with crucial residues concerning the catalytic domains of class A [InterPro ID: IPR045155], class B [InterPro ID: IPR001279], class C [InterPro ID: IPR001466] and class D [InterPro ID: IPR001460] of  $\beta$ -lactamases as defined in the InterPro database. All-atom molecular dynamics simulations, supported by principal component analysis and free energy landscape analysis, confirmed the stability of ESBLs-HFIAP-1\_M5 showing stable backbone profiles with minimal residue-level fluctuations throughout the simulation timeframe. Binding free energy calculations along with the energy decomposition analysis further highlighted the key residue contributions to complex stabilization. The study holds promise in developing a combination therapy upon augmenting HFIAP-1\_M5 with susceptible  $\beta$ -lactam antibiotics to enhance the therapeutic spectrum of treatment after further experimental validations.

**Keywords** Antimicrobial peptides · Extended spectrum  $\beta$ -lactamases · Intermolecular interactions · Molecular docking · Molecular dynamics simulation

5. Prasasti Sarma, Aravind Madhavan, Soumya R.S, Arun K B. Pharmacological Insights into Banana Inflorescence - A Review of Antioxidant, Antimicrobial, Antidiabetic, and Anticancer Potential. International Journal of Pharmaceutical Sciences. 2025, Vol 3, Issue 9, 242–253

 INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES  
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Journal Homepage: <https://www.ijpsjournal.com>

OPEN ACCESS

Review Article

**Pharmacological Insights into Banana Inflorescence - A Review of Antioxidant, Antimicrobial, Antidiabetic, and Anticancer Potential**

Prasasti Sarma<sup>1</sup>, Aravind Madhavan<sup>2</sup>, Soumya R. S.<sup>3</sup>, Arun K. B.<sup>\*4</sup>

<sup>1,4</sup>Department of Life Sciences, CHRIST (Deemed to be University), Bangalore - 560029, Karnataka, India.  
<sup>2</sup>School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri Campus, Kollam - 690525, Kerala, India.  
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Musa species, Banana inflorescence, Phytochemicals, Antioxidant, Antidiabetic, Antimicrobial, Anticancer, Polyphenols, Flavonoids  
DOI:  
10.5281/zenodo.17017283

**ABSTRACT**  
The *Musa* genus, widely cultivated, known for its dietary importance, nutrient profiling, with all these qualities, exhibits a broad spectrum of traditional medicinal applications. Along with various fruits, vegetables, and plants, studies have discovered that the unused byproduct part, specifically the floral structures known as the heart of a banana or banana blossom, has shown great potential for pharmacological and therapeutic investigations due to its rich array of bioactive constituents. This review highlights on the significance of the banana blossom, it shows a combined findings from recent research on *Musa* species, particularly targeting the inflorescence part highlighting its notable applications towards the antioxidant potential, which is largely regulated due to presence of substantial levels of polyphenols, flavonoids compound and their derivatives that neutralizes cellular oxidative damage. The study further explores and continues the antidiabetic action exhibited by the banana flower extracts, which slow down the action of carbohydrate-digesting enzymes, resulting in lowering the glucose levels. In addition, the extracts' antimicrobial potential is also visualized against microbial strains. By analysing the current and recent body of literature, this study presents a well-structured view and comprehensive perspective on the therapeutic and ethnomedicinal promise of banana inflorescence. It encourages and promotes the future aspect and development in this field of pharmacology using natural-based products.

## Book Chapters:

1. Joy S, Sreedharan M, Abraham R, George SS, Thomas NG, Sukumaran A, Thomas S. Green Synthesis of Nanoparticles in Biomedicine. Micro-and Nanoscale Technologies in Drug Delivery: A Contemporary Chemical Approach. 2025 Sep 23:193.
2. Mohammed R, Balakrishnan R, Thomas NG, Dalvi YB. Biocompatible Nanocomposites: Synthesis, Challenges, and Future Prospects in Biomedical Applications. Biocompatible Nanocomposites: From Synthesis to Applications. 2025 Aug 26:1-6.
3. S Anil, N Suresh, VK Sweety, AR Suraj, NG Thomas, Biocompatible Nanocomposites: An Overview of Materials Used in Biomedical Applications. Biocompatible Nanocomposites: From Synthesis to Applications, 17-61

# Congratulations



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**Prof. (Dr) Sabu  
Thomas**



**Prof. (Dr) Anil  
Sukumaran**



**Prof. (Dr) Nandakumar  
Kalarikkal**



**Dr. Robin  
Augustine**

“Pushpagiri Research Centre proudly congratulates Prof. (Dr) Sabu Thomas, Prof. (Dr) Anil Sukumaran, Prof. (Dr) Nandakumar Kalarikkal, and Dr. Robin Augustine for their outstanding global recognition. Their dedication, mentorship, and scientific contributions continue to inspire our community.”