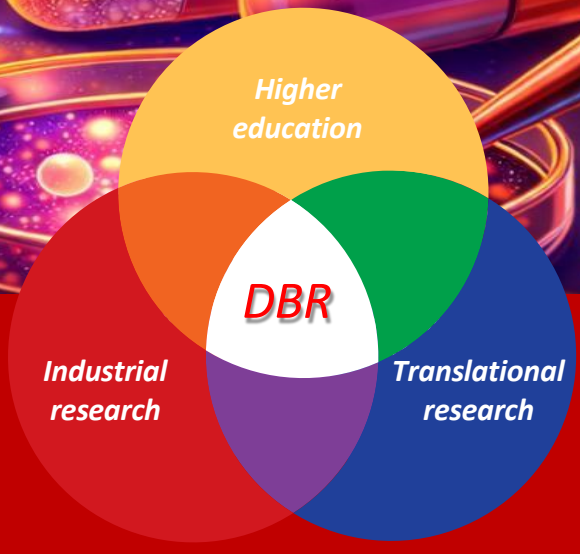
Vol: 16 October – December 2025

Biotheracues

Quarterly Newsletter of Department of Biotherapeutics Research



MANIPAL
ACADEMY of HIGHER EDUCATION
(Institution of Eminence Deemed to be University)

Contents

From the desk of the In-Charge Head (DBR)

Dear All,

Taking up as In-charge Head of DBR, I remain committed to strengthening our research ecosystem in alignment with the department's mission and vision. The October–December 2025 quarter has been particularly energising, marked by new collaborations, sustained publication output, and a steady pipeline of invention disclosures and patent filings. This period also featured vibrant academic engagement through invited talks and an ANRF-sponsored symposium-cum-workshop conducted in collaboration with an industry partner.

I am pleased to share that our fourth batch of M.Sc. (Research) in Biotherapeutics students successfully completed their first-semester University examinations. In addition, our scholars showcased DBR's work at national and international forums, earning recognition through poster and oral presentations. We were also delighted to host visiting trainees and interns, whose enthusiasm brought fresh perspectives to ongoing projects.

As we close the calendar year, I thank every faculty member, staff colleague, and student for the discipline and teamwork that define DBR's culture. I look forward to an even more impactful 2026, with deeper collaborations and continued excellence.

Dr. S V Kirthanashri

Message from the Chief Editor

Dear friends and well-wishers of DBR,

It is a privilege to present the 16th edition of **Biotheracues**, a testament to a quarter defined by transition, resilience, and academic rigour. As we wrap up 2025, this issue showcases a department in its prime, striking a balance between the pursuit of high-impact research and a deep commitment to student success. The final quarter of the year has been particularly vibrant. and has sharpened its focus on strengthening our research ecosystem. We are proud to highlight our recent ANRF-sponsored symposium with a workshop, a significant milestone that bridges the gap between academic theory and industry practice. Our research pipeline remains robust, with a steady stream of invention disclosures and patent filings that underscore our role as innovators in the field of biotherapeutics. Another milestone is the release of our edited book, "The Potential of Intermittent Fasting in Age-related Diseases and Precision Antiaging Therapeutics", published in November 2025 by Academic Press {Elsevier}.

Most importantly, we celebrate our students. With our second batch of **M.Sc. (Research) in Biotherapeutics** students graduating, we remain committed to our core mission of nurturing the next generation of scientific leaders. Their success at national and international forums continues to bring honour to DBR.

As we look towards 2026, we do so with gratitude for the discipline and teamwork that define our culture. We invite you to explore these pages and join us on our journey of discovery and excellence.

Dr. Ramya Nair

Success Story of DBR

A special note of appreciation and heartfelt congratulations to the graduating **batch 2023-2025**. Your hard work, resilience, and growth have been remarkable. We wish each one of you the very best as you step into the next phase of your academic and professional journeys. May your paths be filled with learning, purpose, and success. We look forward to staying connected and building a stronger, collaborative alumni network in the years ahead.

We are pleased to share the successful release of our edited book, **"The Potential of Intermittent Fasting in Age-related Diseases and Precision Antiaging Therapeutics"**, published in November 2025 by Academic Press (Elsevier). The book was formally released on 26th December 2025 at the 4th Floor, Manipal.edu Building, Manipal Academy of Higher Education (MAHE), Manipal, by Dr. H. S. Ballal, Pro Chancellor, MAHE.

Edited by Dr Abhishek Kumar Singh, Dr. Jitendra Kumar Sinha, and Dr. Raviraja N Seetharam, PhD, MBA, this book presents comprehensive insights into the role of intermittent fasting in modulating age-related diseases, metabolic health, and precision anti-aging therapeutics, highlighting emerging mechanisms, clinical perspectives, and future research directions. We sincerely thank the MAHE leadership, contributors, colleagues, and well-wishers for their support in making this milestone a success.

Farewell

Farewell and Congratulations to Dr. Raviraja N. Seetharam *(Founding Head, Department of Biotherapeutics, MAHE)* on his appointment as the **Vice Chancellor, Chandigarh University, Mohali**.

Dr. Raviraja N. Seetharam's visionary leadership, unwavering commitment to academic excellence, and transformative contributions have played a pivotal role in shaping the growth of biotherapeutics at MAHE. Under his guidance, the Manipal Centre for Biotherapeutics Research evolved into the Department of Biotherapeutics Research in a remarkable span of just four years, an achievement that stands as a testament to his foresight, dedication, and tireless efforts.

Beyond institutional growth, Dr. Raviraja has been an inspiring mentor and leader, fostering a culture of innovation, collaboration, and integrity. His passion for research and education has left a lasting impact on students, faculty, and colleagues alike.

On behalf of the entire DBR family, we extend our heartfelt congratulations on this well-deserved appointment and wish him every success as he embarks on this new and prestigious role. We are confident that his leadership will continue to create meaningful and lasting impact in the academic world.

👏 **Wishing you the very best, Sir.** 👏

Farewell

Farewell and Congratulations to Dr. Abhayraj S. Joshi *(Former Assistant Professor, Department of Biotherapeutics Research, MAHE)* on being awarded the prestigious **Marie Skłodowska-Curie Fellowship**.

The Department of Biotherapeutics Research bids a fond farewell to Dr. Abhayraj S. Joshi as he embarks on an exciting new chapter in his academic journey. His achievement of receiving the highly competitive Marie Skłodowska-Curie Fellowship is a testament to his outstanding research capabilities, dedication to scientific excellence, and commitment to advancing knowledge in the field of biotherapeutics.

During his tenure as Assistant Professor in DBR, Dr. Joshi made valuable contributions to research, teaching, and mentorship. His enthusiasm for science, collaborative spirit, and thoughtful guidance have had a meaningful impact on students and colleagues alike, enriching the academic environment of the department.

On behalf of the entire DBR family, we extend our heartfelt congratulations to Dr. Abhayraj S. Joshi on this remarkable accomplishment. We wish him continued success in his future endeavors and are confident that he will excel and make significant contributions on the global research stage.

2-days Workshop on “Computational Approached in Disease Mechanism and Therapeutics”

A two-day workshop titled **“Computational Approaches in Disease Mechanisms and Therapeutics”** was successfully conducted on 27–28 October 2025, aiming to provide participants with an in-depth understanding of modern computational tools used to study biological systems and accelerate therapeutic discovery.

Day 1 (27 October 2025)

Day 1 focused on interactive sessions on Systems Biology, introducing participants to network-based analysis, pathway mapping, and the use of computational models to decode disease mechanisms at a systems level.

Day 2 (28 October 2025)

Day 2 centred on Computational Biophysics, covering protein structure analysis, molecular interactions, and the fundamental principles behind structure-based drug discovery. Through demonstrations and discussions, participants gained insights into how computational biophysics complements experimental approaches in understanding disease-associated biomolecules.

A key highlight of the workshop was an expert lecture by **Dr. Vijay Kumar,** PhD, Associate Professor, Amity Institute of Biotechnology (AIB), Amity University, Noida, on **“Computational Biophysics and Network Biology to Understand and Target Human Diseases.”** His session offered valuable insights into integrating biophysics and network biology to address complex biomedical challenges.

Cell Therapy Conclave - 2

The Cell Therapy Conclave – 2, jointly organized by the Department of Biotherapeutics Research (DBR), MAHE, and Kasturba Medical College, Manipal, was held on October 30th and 31st, 2025, encompassing two days of inspiring discussions on the future of regenerative medicine.

Day 1 (30 October 2025)

The event was inaugurated in the presence of eminent personalities, including the President of the ceremony, Lt. Gen. (Dr.) M. D. Venkatesh, Vice Chancellor, MAHE, the Guests of Honor, Dr. Sharath K Rao, Pro-Vice Chancellor, MAHE and Mr. Manohar B N, MD&CEO, Stempeutics Research Pvt Ltd, the Chief Guest, Dr. Maneesha S Inamdar, Director, BRIC-InStem & Professor, JNCASR, Bengaluru, along with the organizing chairpersons, Dr. Raviraja N S, Senior Director-Research, MAHE, Professor and HOD, DBR, MAHE, and Dr. Anil K Bhat, Dean, Professor, Department of Hand Surgery, KMC, Manipal. The conclave brought together leading scientists, clinicians, and biotech innovators to explore advances in cellular therapeutics, gene editing, and translational research, with talks from esteemed speakers including **Dr. Akhil Kumar**, Chief Medical Officer, Aurigene Oncology Ltd, Bengaluru, **Dr. Rahul Purwar**, Founder & CEO of ImmunoACT, Mumbai.

Cell Therapy Conclave - 2

Day 2 (31 October 2025)

Day 2 continued the momentum of scientific exploration with talks from distinguished speakers including **Dr. Maneesha S Inamdar**, Director, BRIC-InStem & Professor, JNCASR, Bengaluru, **Dr. Vikram Mathews**, Director, Professor of Clinical Hematology, Christian Medical College, Vellore, **Dr. Abheek Kar**, Orthopaedician, Apollo Multispeciality Hospital, Kolkata, and **Dr. Dinesh Kundu**, Chief Executive Officer and Co-Founder, EastOcyon Bio, Gurugram, Haryana, who shared their insights into the evolving landscape of cell-based therapies. During the valedictory ceremony, the efforts of the poster presenters were recognized, and the winners were congratulated by the Chief Guest, **Mr. Manohar B. N**., MD & CEO, Stempeutics Research Pvt. Ltd.

Over 250 students and young researchers participated in interactive sessions and poster presentations, reflecting the growing curiosity and collaboration that drive this field forward.

Symposium and Workshop: Frontiers in Gamete Biology and Stem Cell Research

The Department of Biotherapeutics Research (DBR), MAHE, Manipal, in collaboration with the Department of Reproductive Science, KMC, Manipal, successfully inaugurated the Symposium and Workshop on Frontiers in Gamete Biology and Stem Cell Research: Applications in Reproductive Medicine.

Day 1 (15 December 2025)

The inaugural session was graced by the Chief Guest, Dr. Sharath K. Rao, Pro Vice Chancellor – Health Sciences, MAHE, and Guest of Honor, Dr. Satish Kumar Adiga, Professor, Department of Reproductive Science, KMC, Manipal, in the presence of Dr. Kirthanashri S. V, Associate Professor & In-charge Head, DBR, Dr. Shubhashree U, Associate Professor & Head, Department of Reproductive Science, KMC, Dr. Anil K. Bhat, Dean, Kasturba Medical College, Manipal, and the convenor Dr. Ramya Nair, Assistant professor, DBR. This was followed by a keynote lecture by **Dr. Rafael A. Fissore** (University of Massachusetts, USA) on Calcium Signalling in Oocyte Activation, followed by insightful scientific talks from **Dr. Arnab Banerjee**, on the role of polyamines in regulating GnRH and ameliorating PCOS, **Dr. Pankaj Suman**, on how low-fat diet–induced metabolic reprogramming impacts reproduction across generations, and **Dr. Gagandeep Gahlay**, on The ZP2 and ASTL genes: the emerging genetic contributors to unexplained female infertility and recurrent IVF failure. The day concluded with a demonstration on Transcriptomic Analysis by NGS at the MAHE Anderson Centre of Excellence in Reproductive Genomics, bridging fundamental biology with practical translational tools.

Symposium and Workshop: Frontiers in Gamete Biology and Stem Cell Research

Day 2 (16 December 2025)

Day 2 of the symposium continued with focused scientific discussions bridging fundamental reproductive biology, emerging technologies, and clinical translation.
The sessions featured expert talks by **Dr. Debasree Dutta, Dr. Guruprasad Kalthur, Dr. Rajesh Kumar Jha, Dr. Kirthanashri S. V,** and **Dr. Nikhil Shetty**, addressing key themes ranging from molecular regulators of development and infertility genetics to inflammation, biomedical applications, and stem cell–based approaches in reproductive medicine. The program also provided a platform for young researchers to present and engage with senior scientists.

The symposium concluded with the Valedictory Ceremony, graced by the Chief Guest Dr. G. Arun Maiya, Dean, Manipal College of Health Professions, MAHE, along with Dr. Kirthanashri S. V, Associate Professor & In-charge Head, DBR, Dr. Shubhashree U, Associate Professor & Head, Department of Reproductive Science, KMC, and the convenor Dr. Ramya Nair, Assistant Professor, DBR.
The sessions reflected on the scientific deliberations, recognized the awardees of oral presentations, and reaffirmed the importance of interdisciplinary collaboration in advancing reproductive and stem cell research.

Activities at DBR

Establishment Day & Lab Inauguration

The Department of Biotherapeutics Research commemorated its 4th Establishment Day with a series of meaningful events. The occasion commenced with a Pooja ceremony (Gana Homa), followed by the inauguration of R&D Lab 5 by **Mrs. Vasanti R Pai**, Trustee, MAHE Trust, along with **Dr. H S Ballal**, Pro-chancellor, MAHE, Manipal, **Dr. Sharath K Rao**, Pro Vice-Chancellor, Health Sciences, MAHE, Manipal, **Dr. Raviraja NS**, Head, Department of Biotherapeutics Research, MAHE, Manipal, University officials, and Heads of various Departments and Institutions of MAHE, marking an important milestone in the department's expanding research infrastructure. As part of the celebration, we were honored to host **Dr. K. R. Sridhar**, Professor and UGC-BSR Faculty, Mangalore University, who delivered an invited lecture on "Mushrooms and Their Nutraceutical Potential." Following this, Dr. K. R. Sridhar was felicitated by the faculty at DBR for his contributions to the fields of Mycology and Ecology.

Alumni Meet

The Department of Biotherapeutics Research had the pleasure of welcoming back our alumni for the Alumni Meet 2025 on 22nd November, creating a space for meaningful interaction, shared memories, and informal discussions that reflect the spirit of our department. A special note of appreciation and heartfelt congratulations to the graduating batch. Your hard work, resilience, and growth have been remarkable. We wish each one of you the very best as you step into the next phase of your academic and professional journeys. May your paths be filled with learning, purpose, and success. We look forward to staying connected and building a stronger, collaborative alumni network in the years ahead.

Research Progress

Publications: [#Joint first authors, *Co-corresponding/Corresponding authors]

1. **Swekcha#**, **Meghana#**, T., Agarwal, A., Prabhu, K., & **Joshi, A. S.*** (2025). RP-HPLC: A Versatile Technique for Identification, Isolation, and Characterization of Therapeutic Antibodies. In *Advanced Biophysical Techniques in Biosciences* (pp. 169-192). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-94551-9_8
2. **Borra, S**., HK, A., D'souza, V., Shinde, V., Sandhu, J. S., Pandey, A. K., ... & **Vasanthan, K. S.*** (2025). In vivo subcutaneous biocompatibility evaluation of decellularized tilapia fish skin in a rat model. *Scientific Reports*, *15*(1), 37982.https://doi.org/10.1038/s41598-025-21808-7
3. **Gadre, M**., & **Vasanthan, K. S.*** (2025). Engineering a GelMA–dECM-based 3D bioprinted liver fibrosis model: methotrexate-induced functional and molecular validation. *RSC advances*, *15*(44), 37012-37026.
4. **Joshi, J. M.,** Verma, S., Upadhya, R., Bhat, S., & **Seetharam, R. N.*** (2025). Inflammatory priming of mesenchymal stromal cells enhances its secretome potential through secretion of anti-inflammatory and ECM modulating factors: Insights into proteomic and functional properties. *Biochemical and Biophysical Research Communications*, 152391. doi: 10.1016/j.bbrc.2025.152391. Epub 2025 Jul 24. PMID: 40716306.
5. **Mathur, V.**, Joshi, J. M., NC, S., N Seetharam, R., & **Vasanthan, K. S.*** (2025). Technique for decellularization and characterization of rat esophageal extracellular matrix for potential application as a 3D scaffold. *Bioengineered*, *16*(1), 2564563.https://doi.org/10.1080/21655979.2025.2564563
6. **Joshi, J. M.**, Verma, S., Seetharam, R. N., & **Singh, A. K.*** (2025). Stem cell-free therapy for healthy brain aging: Mechanisms, challenges, and prospects. *Biomedicine & Pharmacotherapy*, *192*, 118676.doi: 10.1016/j.biopha.2025.118676. Epub 2025 Oct 22. PMID: 41130100.
7. **Singh, I.**, & **Singh, A. K.*** (2026). Senolytics as Modulators of Critical Signaling Pathways: a Promising Strategy to Combat Brain Aging and Neurodegenerative Disorders. *Molecular Neurobiology*, *63*(1), 261. https://doi.org/10.1007/s12035-025-05504-1
8. Singh, V., Kashif, M., Ubaid, S., Singh, T., Pahwa, R., **Singh, A. K., & Singh, A.*** (2025). Advancements in High-Performance Liquid Chromatography: Transforming Analytical Chemistry Across Biomedical, Pharmaceutical, and Environmental Domains. In *Advanced Biophysical Techniques in Biosciences* (pp. 137-167). Cham: Springer Nature Switzerland.https://doi.org/10.1007/978-3-031-94551-9_7
9. **Singh, A. K**., & Rai, S. N. (2025). Rejuvenating the Brain: Nutraceuticals, Autophagy, and Longevity.
10. **Nayak, S.**, Sabu, M., Devadiga, D., Ahipa, T. N., Gaonkar, S. L., & **Raviraja, N. S.*** (2025). Synthesis, in silico analysis, anticancer activity and photophysical properties of novel benzisoxazoles. *Journal of Molecular Structure*, 144538.

Research Progress

International Conferences

1. Dr. Raghavendra Upadhya, Assistant Professor, DBR, MAHE, participated in a 3-day Symposium on 'EVs in Immunity', organized by the International Society of Extracellular Vesicles, ISEV Admin held at Divani Caravel Hotel, Athens, Greece. Dr. Upadhya presented a scientific poster titled “Development of Novel Technology Platform for Precision Drug Delivery using Bioengineered Extracellular Vesicles”,

2. Dr. Abhishek Kumar Singh was invited as a Distinguished Speaker at the International Convention – EARTH 2025 (Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment) hosted by CSIR-Indian Institute of Toxicology Research, Lucknow, in collaboration with Michigan State University, from 12-15th November 2025.

3. Dr. Souvik Dey was an Invited Speaker at the International Conference on Advances in Endocrinology, Metabolism, and Reproductive Health: New Insights and Innovations, held at IIT-BHU, Varanasi, and jointly organized by the Indian Society for Comparative Endocrinology and the Department of Zoology, Banaras Hindu University, from 14- 16th November 2025. Dr. Dey delivered a lecture entitled “GSK3α Disruptor: A Non-hormonal Contraceptive Targeting Maturing Spermatozoa in the Epididymis,” in which he presented recent advances from his laboratory on the development of a reversible, non-hormonal male contraceptive strategy.

4. Ms. Amrutha HK, a Dr. TMA Pai Research Scholar at DBR, MAHE, under the guidance of Dr. Kirthanashri S Vasanthan, Associate Professor & In charge Head DBR, delivered an oral presentation at the 40th International Conference – BioMANTHAN 2025, jointly organized by SBAOI & STERMI and hosted at IIT Ropar, Punjab, from 4–7th December 2025. She presented her research on "Incorporation of Decellularized Wharton’s Jelly Proteins in 3D Bioprinted Implants for Enhanced Wound Healing.“

5. Mr. Rounak Roy, Project Research Scientist I, under the guidance of Dr. Souvik Dey, presented a poster at the 94th Annual Meeting of the Society of Biological Chemists (India) [SBC(I)], held at the University of Hyderabad from 17-19th December 2025. He presented poster of his research on “Fundamental role of GSK3α in sperm development and its impact on male reproductive function”.

Research Progress

Award Winners

1. **Dr. Abhishek Kumar Singh** participated as a speaker at the International Conference on Bridging Innovative Research in Translational and Interventional Health (BIRTH-2025), held from 13-15th November 2025, at the University of Lucknow. In his presentation titled "Autophagy Rejuvenates the Aging Brain", Dr. Singh discussed how cellular self-repair mechanisms contribute to maintaining neuronal health and slowing brain aging, earning him **the Best Oral Presentation Award**.
2. **Ms. Varsha Pai** participated in the APA International Conference held in Udaipur, Rajasthan, from 13–15th October 2025, which provided an excellent platform to connect with inspiring researchers and explore emerging scientific advancements. She presented her work both as a poster and an oral presentation, earning her a spot in the Wiley Oral Contest, where she was honored with **the Best Oral Presentation Award.**

3. **Ms. Neha Choudhari**, working under the guidance of Dr. Souvik Dey, recently presented a research poster at the International Conference on ReproNext: Emerging Horizons in Reproductive Health Research & the 42nd Annual Meeting of the Society for Reproductive Biology and Comparative Endocrinology (SRBCE-2025), organized by ICMR-NIRRCH and held in Mumbai from 11–13th December 2025. Neha presented a poster titled "Role of GSK3α in regulating the RNA demethylase FTO during spermatogenesis in mice,". In recognition of the scientific merit and clarity of presentation, Ms. Neha Choudhari was awarded the **Prof. N. J. Chinoy Best Poster Award (First Position)** at the conference.
4. **Ms. Prachi Agarwal**, Dr. TMA Pai research scholar under the guidance of Dr. S.V. Kirthanashri, participated in the 34th Annual Conference of the European Society for Biomaterials (ESB 2025), held from 7-11th September 2025 at the Lingotto Conference Centre, Turin, Italy. She presented a scientific poster titled "Optimizing MSC Secretome-Embedded Silk-Based 3D Printed Biomaterial for Wound Dressing". Her participation was made possible through the **ANRF Travel Grant**, which supported her representation of DBR, MAHE, at this globally renowned scientific platform.

Seeking science beyond the shores - A researcher's blog

Ms. Prachi Agarwal
Dr TMA Pai Research scholar

The journey to the European Society for Biomaterials (ESB) 2025 in Turin, Italy, turned out to be much more than a conference trip. It began months before the travel itself, with preparing data, refining the poster, and thinking about what it would mean to attend an international conference for the first time. Along with scientific preparation came anticipation—about presenting my work on a global platform, engaging with researchers from diverse backgrounds, and managing the experience independently. Arriving in Turin marked the moment when all of this became real.

Settling into a new country was both exciting and a learning experience. From navigating public transport to exploring the city, everything was new. Having always been drawn to historical places, walking through Turin's elegant streets, quiet squares, and centuries-old architecture—set against the backdrop of the Alps—felt especially meaningful. The city's calm, academic atmosphere offered moments to pause and reflect between busy conference days.

The ESB 2025 Annual Meeting (07–11 September 2025) was an inspiring experience. Observing how a large international conference functions—the diversity of participants, the breadth of research, and the exchange between basic science and clinical application—provided a valuable perspective. Sessions spanning tissue engineering, regenerative medicine, cell-based therapies, and biofabrication offered a clearer understanding of the field's current direction and future potential.

Presenting my poster, "Optimizing MSC Secretome-Embedded Silk-Based 3D Printed Biomaterial for Wound Dressing," was one of the most rewarding parts of the experience. The discussions that followed encouraged me to articulate my work more clearly and think beyond prepared explanations. Conversations around scaffold design, secretome integration, and translational challenges helped shape a more forward-looking view of my research and its potential applications.

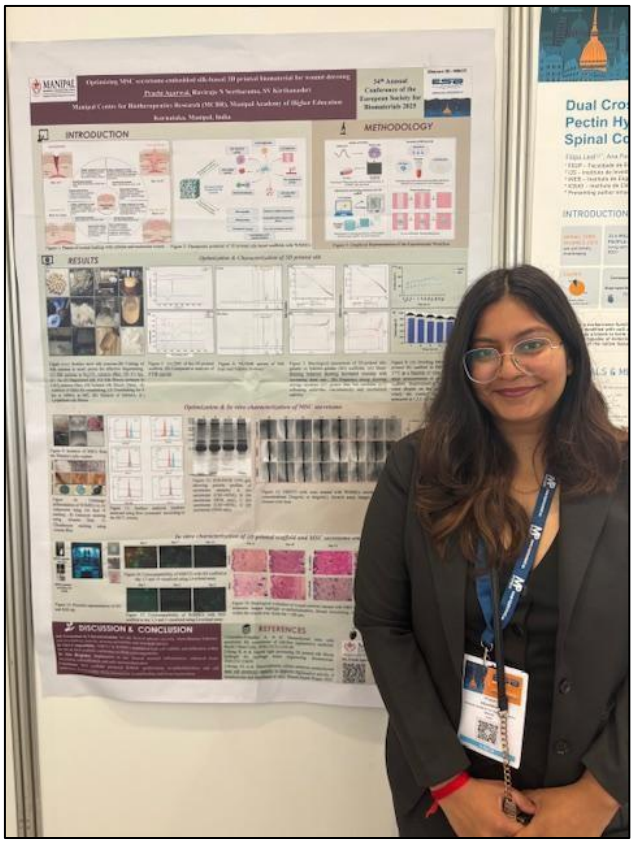
Equally impactful were the informal moments, coffee-break conversations, and spontaneous discussions that revealed the collaborative and approachable nature of the scientific community. Exploring Turin beyond the conference, through its museums and historic streets, added a personal dimension to the journey and helped build confidence through independent travel.

Throughout this experience, I was fortunate to have strong support from my department, the guidance of Dr. Kirthanashri S Vasanthan and Dr. Raviraja N Seetharam, the encouragement of friends, and the Anusandhan National Research Foundation (ANRF), whose travel grant made this opportunity possible.

As the conference and trip came to a close, it became clear that ESB2025 offered far more than academic learning. It broadened my perspective, strengthened my confidence, and reaffirmed my interest in translational biomaterials research—reminding me that stepping outside one's comfort zone often leads to the most meaningful growth.

Ms. Prachi Agarwal, Dr. TMA Pai Research Scholar

Seeking Science beyond the shores - A researcher's blog



ARTICLE UNDER FOCUS

Ms. Swathi Borra,
Research Assistant

scientific reports

Check for updates

OPEN

In vivo subcutaneous biocompatibility evaluation of decellularized tilapia fish skin in a rat model

Swathi Borra[1,2], Amrutha H. K.[1], Vinita D'souza[1], Vaibhavi Shinde[2], Jagnoor Singh Sandhu[3,4], Arvind Kumar Pandey[5], Varadharajan Srinivasan[6✉], Raviraja N. Seetharam[1], Chaitanya Doshi[2], Ravindra Doshi[2] & Kirthanashri S. V.[1✉]

Decellularized tilapia fish skin (DTFS) has emerged as a promising biocompatible implant for wound healing due to its high collagen content, retained extracellular matrix (ECM) components, and structural similarity to human skin. This study investigates the decellularization of tilapia fish skin using two protocols including sodium dodecyl sulfate and sodium chloride (Treatment 1) and Triton X-100 and sodium hydroxide (Treatment 2) and evaluates their efficacy and biocompatibility. Decellularization efficiency was assessed through DNA quantification, histological analysis, and scanning electron microscopy. The DNA content in DTFS was significantly reduced (8.65 ± 1.25 ng/mg in Treatment 1 and 18.05 ± 0.85 ng/mg in Treatment 2) compared to native tilapia fish skin (286 ± 11 ng/mg), confirming effective removal of cellular material. Structural integrity of ECM was preserved in both treatments. In vivo biocompatibility was assessed by implanting the native and DTFS subcutaneously in Wistar rats, followed by hematological, biochemical (Urea, ALT, ALP, and LDH), and histological analysis of skin and liver tissues over 28 days. No significant abnormalities were observed in serum parameters or tissue morphology, indicating high biocompatibility. These results support the potential use of DTFS which are biocompatible as viable wound dressing for burn and chronic wound applications.

Keywords Decellularized tilapia fish skin (DTFS), Wound healing, Implant, Collagen, Biocompatibility, SDS-NaCl, Triton X-100-NaOH

The study evaluates the safety and biocompatibility of decellularized tilapia fish skin (DTFS) for use in wound healing and tissue regeneration. Researchers developed two decellularization methods, one using SDS&NaCl and the other using Triton X-100 &NaOH, to remove the cellular material while preserving the extracellular matrix intact. Successful decellularization was confirmed through DNA quantification, H&E staining, gel analysis, SEM imaging and SDS-PAGE, which showed that cellular contents were removed while collagen fibers were preserved. To assess biological safety, DTFS samples were implanted subcutaneously in Wistar rats and monitored for 14 and 28 days. Throughout the study, blood parameters (WBC, RBC, platelets, lymphocytes) and biochemical markers (ALT, ALP, LDH, urea) remained within normal ranges, indicating no systemic toxicity or organ stress. Histological examination further revealed normal skin regeneration, minimal inflammation, and healthy liver structure, confirming excellent tissue compatibility. In contrast, native (non-treated) fish skin caused mild immune responses, highlighting the importance of decellularization. Overall, the research demonstrates that DTFS is a safe, collagen-rich, and biocompatible scaffold capable of integrating well with host tissue. Its low cost, sustainability, and biological performance make it a promising material for next-generation wound dressings and implantable biomaterials in regenerative medicine.

Winter, Howls Again!

Ms. Saswati Paul,
DBT-JRF

In a scientific milestone reminiscent of Game of Thrones, Colossal Biosciences, a USA-based biotechnology company, announced the creation of animals resembling the extinct dire wolf—an apex predator that disappeared from North America over 10,000 years ago. Using advanced genome engineering and ancient DNA analysis, the project represents one of the most ambitious and controversial attempts at de-extinction to date.

Scientists recovered fragmented ancient DNA from dire wolf fossils, including a 13,000-year-old tooth and a 72,000-year-old skull. The fragments were sequenced and compared with modern canines, particularly gray wolves, to reconstruct a partial genetic blueprint. From this, researchers identified 14 key genes containing 20 variants believed to drive characteristic dire wolf traits such as large body size, robust build, wide skull, powerful jaws, pale coat, and distinct vocalizations.

One central gene was LCORL (Ligand Dependent Nuclear Receptor Corepressor Like), a transcription factor known to regulate body size by controlling hundreds of downstream genes. LCORL binds over 1,200 sites in the wolf genome and is linked to size variation across mammals, including humans, livestock, and domestic dogs. Large dog breeds show deletions in a functional domain of LCORL, and genetic analysis revealed similar deleterious changes in the dire wolf version compared to gray wolves. Colossal engineered this ancient LCORL variant—along with 13 other genes—into modern wolf cell lines.

Using CRISPR-based genome editing, scientists introduced 20 targeted edits across these genes in gray wolf cells. The edited cells were cloned, and embryos were implanted into domestic dog surrogates. In late 2024 and early 2025, three pups—Romulus, Remus, and Khaleesi—were born, which Colossal described as functionally de-extincted dire wolves.

Scientifically, the project demonstrated unprecedented precision in vertebrate genome editing and provided valuable insights into linking genes with extinct traits. It also showcased synthetic biology's potential for conservation, including restoring lost adaptive traits in endangered species. Similar technologies are being explored for the woolly mammoth, thylacine, and dodo.

However, the project has sparked debate. Critics argue these animals are not true dire wolves but genetically modified gray wolves, as the original species diverged millions of years ago and its full genome remains unknown. Others caution that de-extinction hype may divert attention from conserving species currently facing extinction and raise ethical concerns about animal welfare and ecological impact.

Ultimately, the dire wolf project highlights both the power and responsibility inherent in modern genetic science—forcing us to reconsider how far humanity should go in reshaping life's past and future.

Decellularized scaffolds in regenerative medicine:

Ms. Nikhila S K,
Dr. TMA Pai Research scholar

Regenerative medicine is an interdisciplinary domain that integrates fundamental research with an application-oriented clinical approach, bridging the way for therapeutic advancement in translation medicine. The aim of regenerative medicine is to repair, replace, and remodel the tissue. To achieve it tissue engineering approaches are used by constructing scaffold which have biocompatibility, non-immunogenicity, mechanical stability and easier fabrication. The synthetic polymers can be used to construct tissue with the mechanical properties, but they lack the cell adherence motif, tigger immune response, not easily degradable and can not potentially replicate the tissue micro-environment. The natural polymers are obtained from the proteins and components of ECM. These polymers can be biocompatible with the cells, but are inadequate in case of mechanical support, biochemical cues, and in providing a native environment.

To overcome the limitations, the decellularized scaffolds which are the extracellular matrix contents are used. These scaffolds are rich in proteins that provide structural integrity, guide cell behavior through biomechanical cues, and also facilitate signal transduction. The ECM components include fibrillar collagens (types I and III), laminin, elastin, fibronectin, and GAG to regulate cell proliferation, differentiation, and adhesion by interacting with cell-surface receptors. The growth factors like VEGF, IGF, Angiotensin II and endothelin I which help in cell viability, maturation, and maintaining scaffold functionality..

Due to the properties of decellularized scaffold, they are used in regenerating heart, muscle, tendon and other tissues in animal and human trails. Tondreau *et.al* in their study constructed a fibroblast-derived vascular scaffold, which was implanted into the SD rat and was found to have a success rate of 83%. The clinical efficiency and translation value of the decellularized scaffold have paved the way for the production of commercial decellularized products like AlloDerm® and Oasis®. These products help in tissue remodelling and recovery in case of diabetic foot ulcer and sores, as they have controlled degradation, angiogenic property, and tissue regenerative capacity.

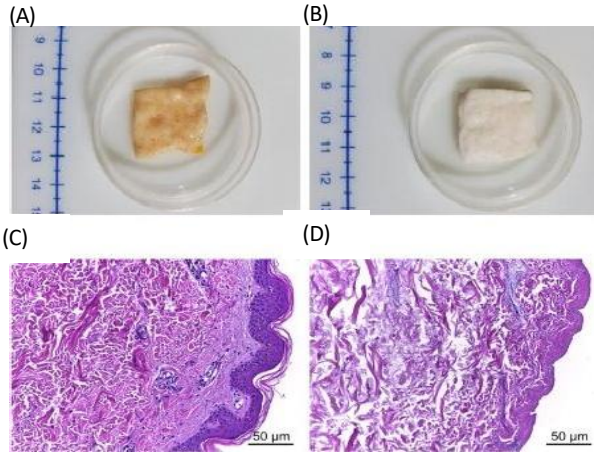


Figure.(A) Native human skin **(B)** Decellularization human skin (d-HuSk) . Representative images of hematoxylin and eosin staining comparing HuSk **(C)** native d-HuSk **(D)** Decellularization human skin d-HuSk. Refe. Belviso *et al*., 2020

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GLOBAL RESEARCH UPDATE

DLP 3D Printing and DLP Bioprinting: Pixel Enabled Platforms Accelerating Biotherapeutics and Regenerative Medicine

Dr. Abhijit Vyas,
Postdoctoral Researcher

Digital Light Processing (DLP) has emerged as a precise biofabrication technology by using patterned light to polymerize photocurable materials. DLP supports two complementary approaches for rapid, reproducible fabrication: DLP 3D printing for fabricating cell-free scaffolds and devices, and DLP bioprinting for constructing cell-laden living architectures. DLP enhances biotherapeutic research by enabling improved cell culture systems, predictive disease models, and standardized platforms for drug screening. These capabilities support a shift from variable empirical testing toward controlled, quantitative systems, improving reproducibility and reducing development timelines.

Advancements in DLP Biofabrication for Biotherapeutics

Recent developments in Digital Light Processing (DLP) biofabrication are enhancing biotherapeutics through:

1. **Optimized Biomaterials**: Refined photocurable systems minimize leachables while improving mechanical stability. Hydrogel matrices, such as GelMA and PEG derivatives, enable adjustable cell encapsulation. Click-chemistry techniques enhance rapid curing and precise crosslinking for better biological consistency.
2. **Standardized Screening Platforms**: Improvements in rapid photopolymerization enable faster printing and higher surface quality, facilitating reproducible fabrication of scaffolds for consistent therapeutic screening.
3. **Functional Tissue Models**: DLP allows for the creation of perfusable channels and hierarchical structures, enhancing the viability of thicker constructs and enabling more relevant assessments of drug efficacy.
4. **Integration with Organ-on-Chip Models**: Combining DLP with microfluidics supports organ-mimetic disease models, improving controlled environments for translational decision-making.

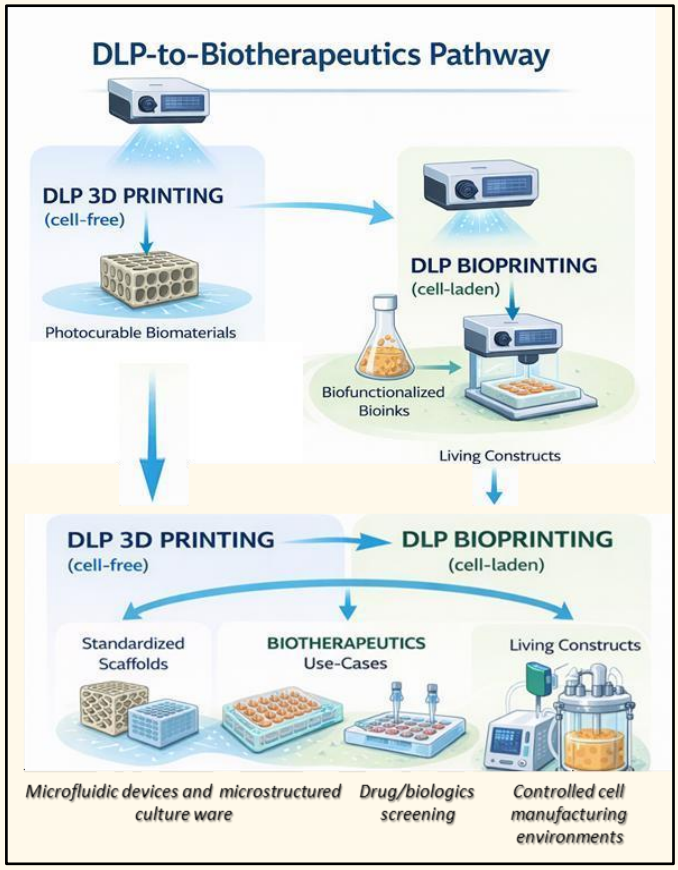

Figure. Schematic representation of the DLP-to-biotherapeutics pathway, illustrating how cell-free DLP 3D printing and cell-laden DLP bioprinting enable standardized scaffolds, microfluidic systems, living constructs, and reproducible screening platforms.

Future Directions

DLP 3D bioprinting is expected to evolve into GMP-compatible biomanufacturing platforms with advancements in multi-material printing, volumetric curing, and visible-light chemistries. Further integration with microfluidics will lead to enhanced organ-on-chip systems, supported by AI for optimization and quality control. Progress in material qualification will be crucial for clinical translation, especially in developing vascularized models to better predict inflammatory and oncology outcomes.

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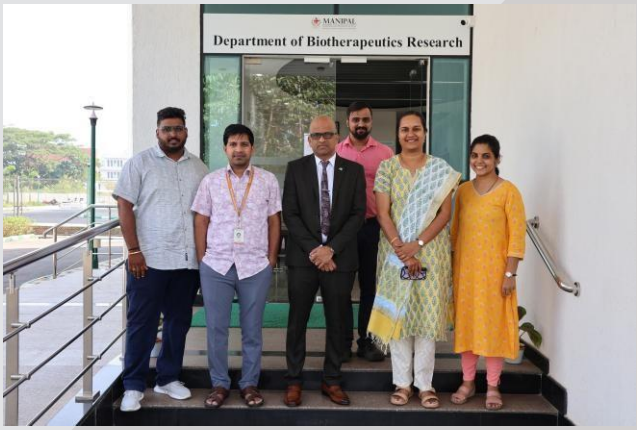
NOTABLE VISITORS

Dr. Madhumita P. Ghosh, from **Ocular Pharmacology & Therapeutics** at **Amity University, Noida**, visited DBR on 23rd October 2025 and had an excellent tour and experience of the DBR facility. She praised the ongoing research work of DBR and appreciated the progress made by DBR in recent years in the fields of Biotherapeutics and the health sector.



Dr. Antony V. Samrat, Director, Research Management Centre, Manipal University, Malaysia, visited DBR on 26th November 2025. He had a quick tour of the facility and lauded the efforts of DBR to perform cutting-edge research in the field of Biotherapeutics.

Delegates from Deakin University, Australia, visited DBR on 27th November 2025. They had great interaction with all the research faculty members. They were very interested in the efforts of the DBR family towards cutting-edge research in the field of Biotherapeutics.

INTERNSHIPS & CURRICULUM VISITS AT DBR

An internship program for B.Tech third-year students from **Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu**, was conducted at DBR from 8th to 22nd December 2025. The program provided hands-on exposure to laboratory techniques, research methodologies, and practical applications relevant to their academic curriculum, fostering skill development and scientific understanding

Students from **MCOPS, MAHE** visited DBR on 9th October 2025, as part of an academic exposure program. During the visit, they formally interacted with faculty members and toured the laboratory facilities. The visit provided valuable insight into the institution's research infrastructure, ongoing scientific activities, and academic environment, fostering meaningful academic engagement and collaboration.

Interns from **AIESEC**, **Netherlands**, comprising second- and third-year MBBS students, were hosted at DBR from 5th to 10th November 2025. The internship program was structured to provide the participants with exposure to interdisciplinary biomedical research carried out at DBR. During their stay, the interns were trained across multiple research groups, where both theoretical discussions and practical sessions were conducted. The program facilitated an understanding of fundamental research concepts, laboratory techniques, and their translational relevance in biotherapeutics.

FUN MOMENTS

Daan Utsav 2025 at Planet Mars Foundation

Beach cleaning drive by Off the Trail club

Navratri celebration at DBR

Birthday celebrations (October- December)

Christmas & Year-end celebrations

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