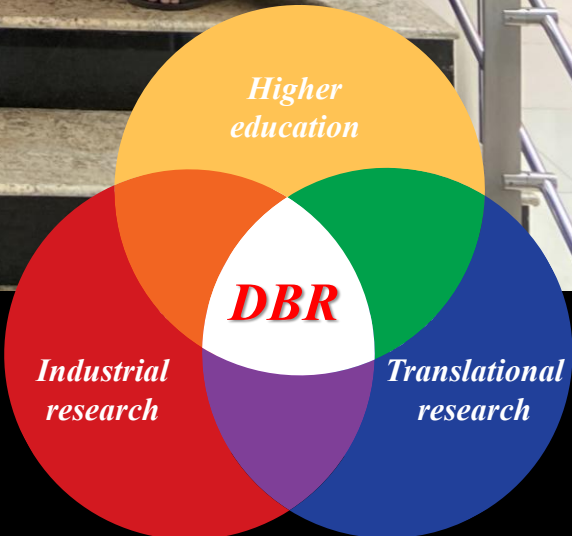


Vol: 17 January – March 2026

# BIO THERACUES

Quarterly Newsletter: Department of Biotherapeutics Research



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

INSPIRED BY LIFE

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



**Dear All,**

At DBR, we continue to move forward with a shared commitment to strengthening our research ecosystem in line with the Department's vision.

The January–March 2026 quarter has been a fulfilling and encouraging period for us. We were happy to welcome two new faculty members to DBR, each bringing focused research expertise in biotherapeutics and adding fresh energy to our dedicated team. It has also been heartening to see our collaborations grow, our research output remains consistent, and our innovation efforts progress steadily. Invited talks and collaborative events further added vibrancy to our scholarly environment and created valuable opportunities for learning and exchange.

I am especially pleased by the progress of our M.Sc. (Research) Biotherapeutics students and the enthusiastic participation of our research scholars at national and international forums, where they represented DBR through poster and oral presentations. It was equally rewarding to connect with young learners during National Science Day and Lab-Fest through interactive sessions that sparked scientific curiosity and encouraged a deeper appreciation for research.

As we look ahead, I extend my heartfelt appreciation to our faculty, staff, and students for their dedication, teamwork, and continued support. Together, I am confident that we will make the year ahead even more meaningful through stronger collaborations, impactful research, and sustained academic excellence.

**Dr. S V Kirthanashri**

## *Message from the Chief Editor*



**Dear friends and well-wishers of DBR,**

We are delighted to present the latest edition of Biotheracues, highlighting a dynamic quarter of learning, collaboration, and outreach.

From industry visits in Bengaluru that offered our M.Sc. students valuable real-world exposure, to vibrant campus celebrations like Sports Day and Annual Day, the department has remained actively engaged both inside and outside the classroom. Our outreach initiatives during Science Day and Lab-Fest brought young students to our labs, sparking curiosity and inspiring future scientific pursuits. Academically, the momentum continues with several research publications advancing the field of biotherapeutics.

As we move ahead, we remain committed to fostering innovation, collaboration, and meaningful learning experiences. We thank our faculty, students, and well-wishers for their continued support, and invite you to explore the highlights of this edition of Biotheracues.

**Dr. Ramya Nair**

# Success Story of DBR

✨ Reflecting a day of academic excellence and vibrant community spirit! ✨

The Department of Biotherapeutics Research (DBR), Manipal Academy of Higher Education, celebrated its 2<sup>nd</sup> Annual Day on 19<sup>th</sup> February 2026, marking a significant milestone in our journey of growth and achievement. We were honored to host [Dr. Abhijeet Pandey](#), Manager – Competitive Intelligence, Hyderabad, as the Chief Guest. The event was presided over by [Dr. Sharath K. Rao](#), Pro Vice Chancellor – Health Sciences, MAHE, whose Presidential Address motivated all in attendance.



[Dr. S V Kirthanashri](#), In-charge Head, DBR, presented the Annual Report, reflecting DBR's academic progress, impactful research, successful grant awards, expanding collaborations, vibrant co-curricular initiatives, and notable international student representation, all as a commitment to holistic growth and excellence.

A key highlight was the Awards Ceremony, recognizing excellence across all levels of the department. Our M.Sc. students (Batch 2023–25 and 2025–27) were honored for academic and research excellence. Special recognition was accorded to the Best Outgoing Student- [Ms. Bhavya Nayak](#), and the Class Topper- [Ms. Prima Yangzi Mishra](#), who received the [Smt. Nagarathna & Sri N. Seetharama Bhat Cash Award](#) sponsored by the founding Head, DBR.

Researchers were recognized for outstanding publications, high-impact research articles, and granted patents. Faculty and staff members were felicitated for excellence in teaching, successful grant acquisition from government agencies and industries, and exceptional departmental support.

The celebration concluded with a vibrant cultural program and gala dinner, strengthening bonds within our academic community.



# Faculty Recruitment



**Dr. Ritu Kudarha** joined DBR as an Assistant Professor, on 8<sup>th</sup> January 2026. She holds a PhD in Pharmacy, specializing in Pharmaceutics, and has expertise in the design and development of advanced drug delivery systems. Her research focuses on targeted drug delivery, nanoparticulate drug delivery systems, nanotechnology for cancer treatment, brain delivery, and optimization. Her work integrates formulation design, mechanistic understanding, and preclinical evaluation to address unmet needs in cancer therapy.



**Dr. Subhashis Sarkar** joined DBR as an Associate Professor, on 12<sup>th</sup> March 2026. With over 15 years of experience in immuno-oncology, he has worked extensively on translating scientific research into viable therapeutic products, including roles at international biotherapeutics organizations in the USA and Switzerland. His expertise spans CAR-NK cell engineering, multispecific antibody design, gene editing of NK cell receptors, and viral delivery systems. His work includes innovative approaches such as targeting CD38 to enhance NK cell-mediated anti-tumor activity. Dr. Sarkar has published in leading peer-reviewed journals and holds patents in CAR-NK technologies for cancer therapy.

# Activities at DBR

## Sports Day

Annual Sports Day was celebrated on 5<sup>th</sup> February 2026, with enthusiastic participation from faculty members, PhD research scholars, and MSc students. The event, presided over by our Chief Guest, **Mr. Rajesh Komarla**, Director Purchase, MAHE, fostered a spirit of teamwork, fitness, and camaraderie across the department. A variety of sporting activities were organised, including running races, long jump, cricket, kho-kho, and badminton, ensuring active involvement from participants of all age groups. The Sports Day served as a refreshing break from academic routines and a reminder to incorporate physical activity into our daily lives, so that we invest not only in our physical health but also in stronger minds, better productivity, and a more sustainable approach to academic and scientific excellence.



The average golf ball has 335 pimples... oops, sorry, we meant... dimples!



## Faculty Team Building Activity



Faculty members of DBR, came together for an engaging and insightful team building workshop held at Manipal Inn on 7<sup>th</sup> March 2026. The session was led by soft skills trainer **Mr. Chandan Rao**, who brought energy, interaction, and practical learning into every activity.

Through a series of collaborative exercises and discussions, the workshop focused on strengthening communication, teamwork, and leadership skills- key elements for a thriving academic environment. The activities encouraged participants to step out of their routine roles, connect with colleagues, and build stronger professional relationships.



# Activities at DBR

## National Science Day & Lab-Fest



We hosted “LabFest” and “National Science Day” in the months of January and February 2026, welcoming students and faculty from various schools and colleges, including Perdoor High School (Perdoor), Annapoorna Vidya Mandira High School (Agumbe), Vasudeva Kripa Vidya Mandira School (Bailoor), Sri Bhuvanendra College (Karkala), St. Aloysius (Mangaluru), Bhandarkars Arts & Science College (Kundapura), MGM College (Udupi), and Poornaprajna College (Udupi).

Participants explored all the research labs, including stem cell culture, hydrogel fabrication, nanoparticle synthesis, and characterization. Interactive sessions on tissue engineering, biomaterials, and translational research sparked engaging discussions.



Ants have no lungs, they breathe through tiny opening all over their body call “spiracles.”



# Activities at DBR

## Educational Visit

M.Sc. (Research) in Biotherapeutics (2024 - 26) students visited premier academic and research institutes in Bangalore from 19<sup>th</sup> to 22<sup>nd</sup> January 2026. This gave them a chance to explore India's biotech hub and learn about innovative research and industry practices. They visited [JNCASR](#), [BRIC-inStem](#), [UASB Agri Innovation Center \(GKVK\)](#), and [MIRM BLR](#), as well as leading industry organizations such as [Danaher Corporation](#), [SCIEX](#), [Kemwell Biopharma](#), [Stempeutics](#), and [Aurigene](#). A highlight was reconnecting with students currently interning at these institutions, Mr. Siddharth Subramanian, Ms. Khushi Bucha, and Ms. Ishitha Jha, whose achievements made the visit especially meaningful. The tour offered valuable insights into industrial R&D culture, advanced analytical instrumentation, biomanufacturing processes, and professional networking.

We sincerely thank all host organizations for their support in shaping the next generation of biotherapeutics professionals.



## Patent Drafting Workshop

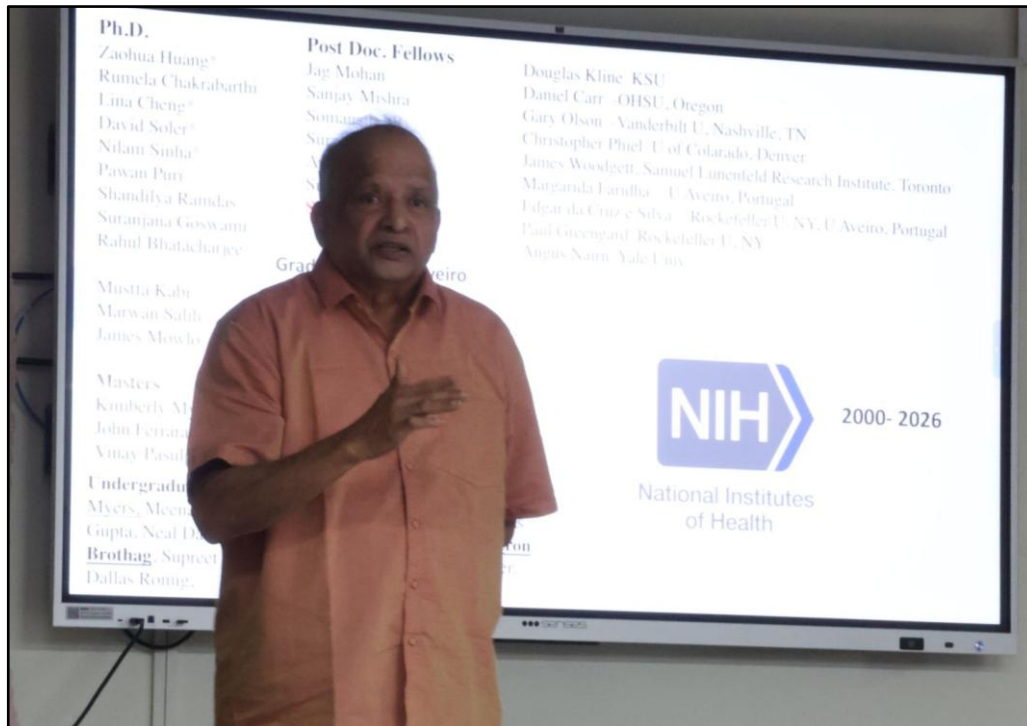
In collaboration with the Directorate of Research (DOR), MAHE, a Patent Drafting Workshop was organized at DBR. The session offered valuable insights into intellectual property, including patents, trademarks, copyrights, and trade secrets.

The workshop was led by Adv. Pranav Bhat, who shared practical perspectives on patent drafting and IP strategy. We extend our gratitude to Dr. Naveen Salins, Director of Research, for his continued support in strengthening the research ecosystem and acknowledge the presence of Dr. Varadharajan and Dr. Namdev Dhas for their contributions to promoting IP awareness and innovation at MAHE.



# Activities at DBR

## Insights into Mammalian Fertilisation: Guest Lecture by Professor (Dr.) Srinivasan Vijayaraghavan



A thought-provoking guest lecture titled “How Sperm Meet the Egg in Mammals: The Roles of Sperm PP1g2 and GSK3 $\alpha$  in Mammalian Fertilization” was delivered by [Dr. Srinivasan Vijayaraghavan](#), Professor in the Department of Biological Sciences at Kent State University, USA, and Adjunct faculty, DBR. He delivered a session on the molecular regulation of sperm function and fertilization mechanisms. Dr. Vijayaraghavan shared fascinating mechanistic insights that advance our understanding of male fertility and reproductive biology. The lecture sparked engaging discussions among faculty members, research scholars, and students, fostering deeper scientific dialogue on the molecular events that govern mammalian fertilization.



Sperm cells have olfactory receptors to sniff out chemical signals from the egg and swim in the right direction (chemotaxis)!



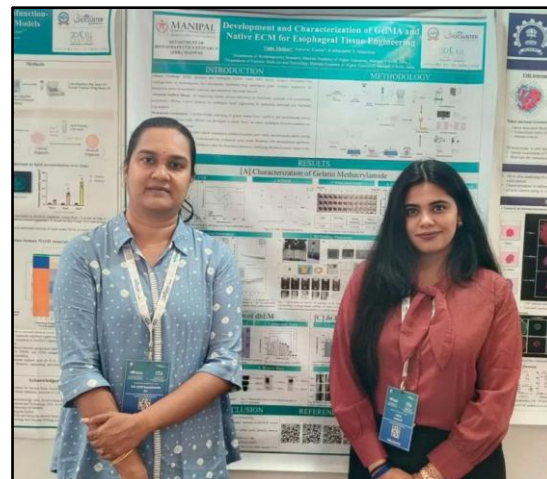
# Research Progress

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

1. Singh I, Bhat S, Tamatta R, Singh AK\* (2026) Interplay Between Autophagy, Cellular Senescence, and Brain Aging: Neuroprotective Implications of Intermittent Fasting. *Cell Mol Neurobiol.* 2026;46(1):75. Published 2026 Mar 11. doi:10.1007/s10571-026-01709-7
2. Khattri V, Giri A, Goel F, Bhange M, Singh AK, Rai SN, Yadav DK (2026) Brain under siege: the role of micro and nanoplastics in neuroinflammation and oxidative stress. *3 Biotech* 16, 108 (2026). <https://doi.org/10.1007/s13205-026-04722-1>
3. Hiremath P, Naik GARR, Roy AA, Kudarha R, Rachana SP, Hedayat P, Patel J, Mutalik S, Singh AK, Dhas N (2026) Mesoporous silica nanoparticles in glioblastoma: smart nano-platforms for targeted therapy and precision diagnosis. *3Biotech*, 16(2): 80. doi: <https://doi.org/10.1007/s13205-025-04639-1>
4. Singh I, Singh AK\* (2026) Senolytics as Modulators of Critical Signaling Pathways: a Promising Strategy to Combat Brain Aging and Neurodegenerative Disorders. *Molecular Neurobiology*, 63: 261. <https://doi.org/10.1007/s12035-025-05504-1>
5. Tamatta R, Pai V, Singh AK\* (2026) Caloric Restriction Mimetics as Drugs for Healthy Longevity. Chapter 19 In: S. I. S. Rattan, C. Gezer (eds.), *Supplements and Drugs for Healthy Longevity, Healthy Ageing and Longevity* 22, Springer Nature Switzerland, pp 385-425. [https://doi.org/10.1007/978-3-032-11608-6\\_19](https://doi.org/10.1007/978-3-032-11608-6_19)
6. Rai SN, Singh AK, Singh P (2026) *Advancing Early Diagnosis in Chronic Diseases: Tools, Techniques, and Technologies* (Book Series: *Advances in Chronic Disease Identification and Management*). 2026. Academic Press (Elsevier). Pages: 1-258, ISBN: 9780443332647 & 9780443332630.
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8. Gutthedhar, M., Hazarika, K., Kumawat, V. S., Raviraja, N. S., Ghosh, S. B., Vasanthan, K. S.\*, & Bandyopadhyay-Ghosh, S. (2026). Beyond graphene: the MXene era in bioprinting. *BioMedical Engineering OnLine*.
9. Meghana, T., Swekcha, Guru, B. R., Mukharya, A., Mutalik, S., & Joshi, A. S. (2026). Incompatibility of resazurin to detect viable cells in lignin biomaterials: a cautionary study. *BMC Research Notes*.
10. Verma, S., Upadhyay, R., Bhat, S., & Seetharam, R. N. (2026). Mesenchymal Stromal Cells and their Derivatives: A Regenerative Frontier in Burn Wound Healing. *Biochemical and Biophysical Research Communications*, 153653.

# Research Progress

Dr. S V Kirthanashri and Ms. Vidhi Mathur represented DBR at BIOLOGICS X 3DCC 2026, held on 22<sup>nd</sup> – 23<sup>rd</sup> January 2026 in Goa. The summit brought together global experts to discuss advances in biopharmaceutical development, including 3D cell culture, organ-on-chip systems, and AI-driven models. Ms. Vidhi Mathur presented a poster on the development of GelMA and native ECM for esophageal tissue engineering, focusing on 3D bioprinted scaffolds.



Ms. Meghana T, under the guidance of Dr. Ramya Nair, presented an e-poster at the International Conference on Precision Medicine in Cancer from 28<sup>th</sup> to 30<sup>th</sup> January 2026.

Her work on quercetin-based green synthesized silver nanoparticles for non-small cell lung cancer highlighted their potential as an anticancer strategy. She also participated in the 27<sup>th</sup> Indo-US Flow Cytometry Workshop–2026 held in Silchar, Assam.

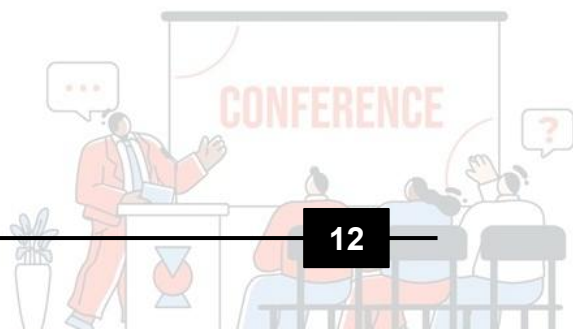
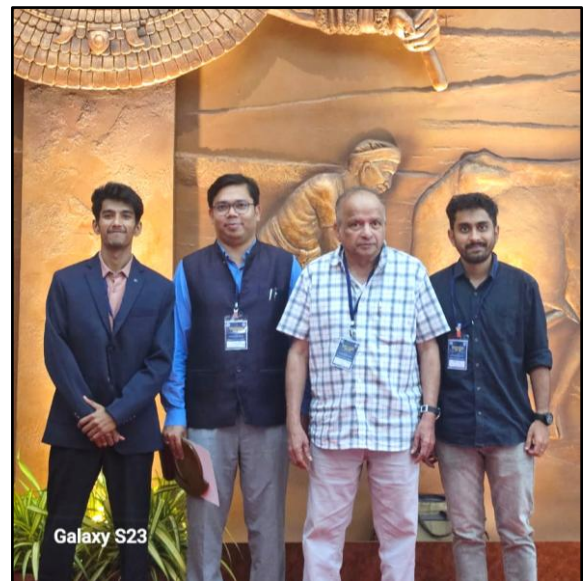
Ms. Meghana was honored with the Major Ashish Kumar Roy Award for Best E-Poster. 🙌

# Research Progress

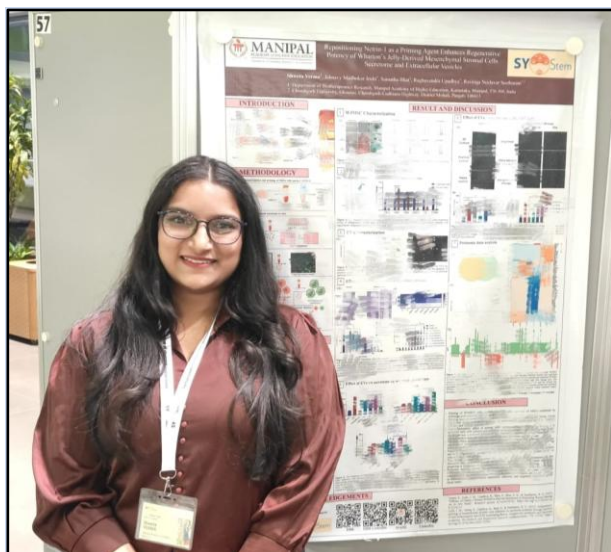


Mr. H.S. Anirudh Srinivas and Ms. Aditi Khamamkar under the guidance of Dr. Souvik Dey from DBR attended ISSRF 2026, held at Banaras Hindu University, Varanasi (20<sup>th</sup> – 22<sup>nd</sup> February 2026). Anirudh presented his work on transcriptional dynamics of human testicular Leydig cells and received the Best Poster Award, while Aditi presented on non-hormonal strategies for male contraception and earned a Special Mention. The summit brought together leading experts in reproductive biology to discuss emerging advances in the field. We congratulate both researchers on their achievements and wish them continued success.

Mr. Rounak Roy and Mr. Praneeth T S, under the guidance of Dr. Souvik Dey, attended the International Conference on Molecular Signalling 2026 held in the Central University of Kerala, Kasargod (28<sup>th</sup> February to 2<sup>nd</sup> March 2026). Mr. Rounak presented on the role of GSK3 $\alpha$  in sperm development and male reproductive function, while Mr. Praneeth spoke on selective GSK3 $\alpha$  inhibition in acute lymphoblastic leukemia during student oral sessions. The conference featured global experts across molecular signaling and translational research.

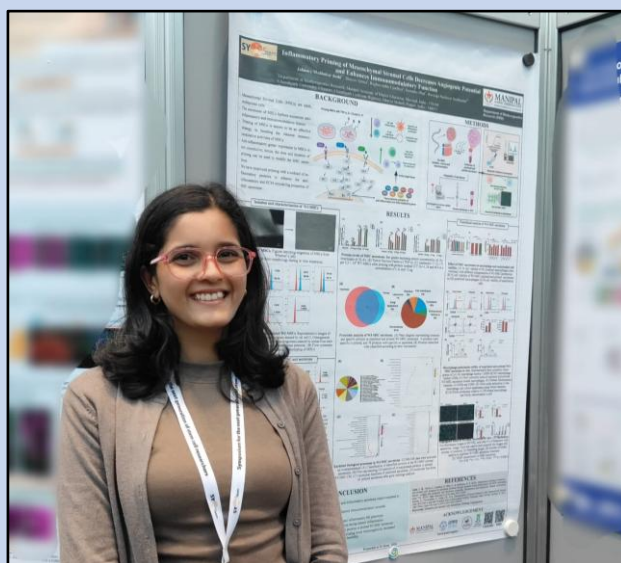


# Research Progress



Ms. Shweta Verma presented a poster on “Repositioning Netrin-1 as a Priming Agent Enhances Regenerative Potency of WJ-MSC Secretome and Extracellular Vesicles,” and Mrs. Jahnavy Joshi presented on “Inflammatory priming of MSCs decreases angiogenic potential and enhances immunomodulatory function.”

Mrs. Jahnavy Joshi and Ms. Shweta Verma participated in SY-STEM 2026 (11<sup>th</sup> – 13<sup>th</sup> March) at the Vienna BioCenter, Austria, supported by the ICMR International Travel Grant. 🙌



Mr. Ramnarayana Bhat, ICMR-JRF research fellow under the guidance of Dr. Raghavendra Upadhyya, represented DBR at IABSCON 2026, held from 24<sup>th</sup> – 26<sup>th</sup> March, 2026, in Goa.

He presented a poster on surface-decorated extracellular vesicles for targeted drug delivery, highlighting strategies to enhance specificity and therapeutic potential. The conference offered valuable opportunities for learning, interdisciplinary exchange, and constructive feedback.



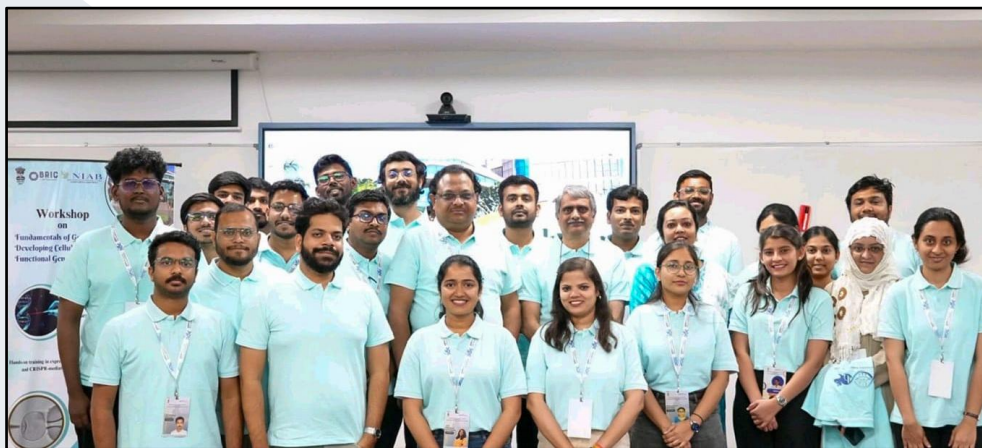


# Workshops Attended



Ms. Charu Jaiswal, ANRF-JRF, under the guidance of Dr. Abhishek Kumar Singh participated in the 4<sup>th</sup> Rodent Surgery Workshop (RS101) held at the Institute of Liver and Biliary Sciences, New Delhi from 5<sup>th</sup> – 7<sup>th</sup> February, 2026).

The workshop provided comprehensive training in rodent biotechnology, surgical techniques, anaesthesia protocols, and advanced experimental models, with sessions led by national and international experts. This experience strengthens capabilities in translational and preclinical research, with a focus on refined practices and experimental rigor.

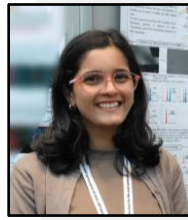


Mr. H.S. Anirudh Srinivas, under the guidance of Dr. Souvik Dey and Ms. Alfa Florence Rodrigues, under the guidance of Dr. Samatha Bhat participated in the Workshop on Fundamentals of Genomic Manipulation held at NIAB, Hyderabad (10<sup>th</sup> – 13<sup>th</sup> March, 2026).

The workshop featured expert lectures and practical training in advanced genome engineering, including CRISPR-based approaches, transfection methods, and transgenic techniques. This experience strengthens their expertise in functional genomics and animal model development.

# Seeking science beyond the shores – A researcher's blog

## From Lab to Landscape: Our Journey at SY-STEM 2026 in Vienna



*Ms. Jahnavy Joshi*  
*DST Inspired Fellow*



*Ms. Shwetha Verma*  
*Dr TMA Pai Research Scholar*

Attending an international conference is always a blend of excitement, nervous anticipation, and immense learning. For us, SY-STEM 2026, held from March 11 to 13 in Vienna, Austria, was not just an academic milestone but was an experience that seamlessly wove together science, culture, and unforgettable travel moments. SY-STEM 2026 brought together researchers, clinicians, and innovators from across the globe, all united by a shared interest in stem cell biology and regenerative medicine. It included plenary lectures, thematic sessions, and poster presentations, with participation from researchers across more than 8 countries. Key sessions focused on developmental plasticity, signaling and patterning, stem cell-based disease modelling, neurodevelopment and neurodegeneration, along with emerging advances in automated and high-throughput stem cell platforms, with implications for MSC biology, immunomodulation, and translational therapeutics. The symposium provided a platform for knowledge exchange, interdisciplinary discussions, and presentation of ongoing research, particularly emphasizing advancements in cell-free therapeutic strategies. Presenting our work in such an environment was both humbling and empowering. Engaging with experts, receiving insightful feedback, and witnessing cutting-edge research firsthand broadened our perspective on where our own work stands and where it can go.

Vienna felt like stepping into a living museum. Every street seemed to carry echoes of history, yet the city buzzed with a modern, vibrant energy. After conference hours, we wandered through cobblestone streets, marvelling at grand architecture and soaking in the city's charm. From the stunning St. Stephen's Cathedral to the serene Schönbrunn Palace gardens, Vienna offered moments of calm after intellectually intense days. One of our favorite experiences was simply sitting in a traditional Viennese café. There's something magical about slowing down with a cup of coffee and a slice of cake, watching the world go by, which is quite different from our usually fast-paced routine at home.

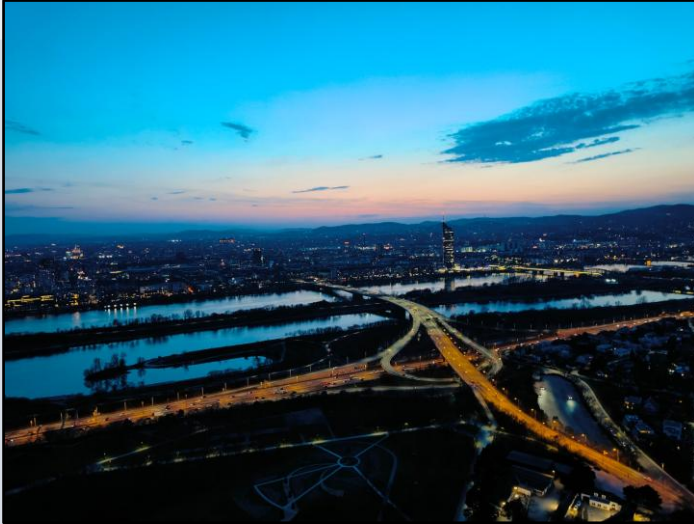
Carrying the sense of stillness with us we later found ourselves at the iconic Vienna Giant Ferris Wheel in the Wiener Prater, the slow ascent of the observation wheel felt almost poetic. As the carriage gently rose, the bustling park below softened into a quiet, expansive view of Vienna's skyline. As the sun went down, the city gently revealed a quieter, more contemplative side and we sought a different perspective, one that quite literally lifted us above it all. From the heights of the Donauturm Wien, the city unfolded in a sweeping panorama. Watching the city transition into twilight from this vantage point, where golden lights began to flicker against the fading sky, created a moment of calm reflection. Experiencing Vienna from above offered a perspective that was both exhilarating and grounding. It was a beautiful contrast to the pace of the conference, offering not just a visual treat but a pause to truly take in the experience of being in a city where history, science, and life coexist so effortlessly.

A short trip from Vienna, the day after the conference, took us to this breathtaking lakeside village nestled among the Alps. Hallstatt looked like something out of a postcard or perhaps a dream. Snow-dusted mountains, still waters reflecting pastel-colored houses, and an almost surreal quietness made it feel otherworldly. We walked along the lakeside, taking in the crisp air and stunning views, occasionally stopping just to absorb the beauty around us. It was a refreshing contrast to the structured environment of the conference, nature's reminder to pause and appreciate.

This journey extended far beyond the scope of a conference; it became an experience of holistic growth. Exploring a new country, immersing ourselves in a different culture, and sharing these moments added a unique depth to our trip.

It reinforced the idea that science does not evolve in isolation. Rather, it is shaped by collaboration, diverse perspectives, and meaningful exposure, often gained not only within conference halls but also through wandering city streets, serene landscapes, and the simple joy of shared experiences. And isn't that the beauty of such experiences, you return not just with knowledge, but with stories.

# Seeking Science beyond the shores – A researcher's blog



**DID YOU KNOW?** 

You probably think that “croissant” is from France, but it has roots in Austria! It is inspired by a pastry called Kipferl!





Ms. T. Meghana  
Dr. TMA Pai Research Scholar

## RESEARCH NOTE

## Open Access



# Incompatibility of resazurin to detect viable cells in lignin biomaterials: a cautionary study

T. Meghana<sup>1</sup>, Swekcha<sup>1</sup>, Bharath Raja Guru<sup>2</sup>, Anoushka Mukharya<sup>3</sup>, Srinivas Mutalik<sup>3</sup> and Abhayraj S. Joshi<sup>1\*</sup>

### Abstract

**Objective** The nanoparticles prepared from lignin polymer and its methacrylated derivative have gained significant attention in the biomedical field owing to their superior biosafety profile. Here, this study aims towards the synthesis of the methacrylated lignin nanoparticles (MLNPs) using the nanoprecipitation method and understanding their biocompatibility in A549 cells using the resazurin assay.

**Results** In our study, the nanoprecipitation method yielded a stable suspension of MLNPs having sub-200 nm size. When incubated with A549 cells, initially, these nanoparticles showed cytotoxicity and reduced biocompatibility from the well-known resazurin assay. However, careful microscopic examination of the cells showed healthy and well-adhered A549 cells with normal cobblestone-like epithelial morphology. Hence, we performed a detailed analysis of MLNPs to understand their interaction with resazurin with respect to concentration and time while keeping pristine lignin nanoparticles (LNPs) as a control. We found that LNPs and MLNPs interfered with resazurin assay, leading to false-positive results. Our study highlights a significant drawback in the use of resazurin assay for these nanoparticles and emphasizes the critical need for alternative approaches to evaluate their biocompatibility. In an attempt to find alternative, conventional MTT assay offered highly reproducible biocompatibility results without any interference during evaluating the cytotoxicity of these nanoparticles.

**Keywords** Lignin, Alkali lignin, Methacrylated lignin, Resazurin, AlamarBlue™, Cell viability assay, MTT assay, A549 cells

This study evaluates the suitability of the resazurin assay for assessing the biocompatibility of lignin-based nanoparticles, specifically lignin nanoparticles (LNPs) and methacrylated lignin nanoparticles (MLNPs), in A549 lung cancer cells. The nanoparticles were successfully synthesized using the nanoprecipitation method, producing stable and uniform particles with sizes below 200 nm. Initial results from the resazurin assay indicated reduced cell viability, suggesting cytotoxic effects. However, microscopic examination showed that the cells maintained normal morphology and healthy adhesion, indicating no actual toxicity. Further analysis revealed that both LNPs and MLNPs interfere with the reduction of resazurin, leading to false-positive results that are not related to true cell viability. In contrast, the MTT assay provided consistent and reliable results, confirming the biocompatibility of these nanoparticles. Overall, this study highlights an important limitation of the resazurin assay and recommends the use of alternative methods for accurate cytotoxicity evaluation.



## Stronger Than Diamonds? A Clever Lesson, Hidden in Carbon



**Ms. Thrupthi Rai**

*Senior Project Assistant (ICMR)*

When we say something is “as strong as a diamond,” we usually mean it’s unbeatable. But what if that idea is already outdated? Scientists have been studying **Hexagonal Diamond**, a rare form of carbon that could be even stronger than conventional diamond. Unlike regular diamonds, which form deep within the Earth under high pressure and temperature, hexagonal diamonds are typically created during **meteorite impacts**. When a meteor strikes the Earth, it generates extreme conditions—pressures exceeding 20 GPa and intense heat—forcing carbon atoms to rearrange into a different structure (1). This material was first identified in meteorites such as the Canyon Diablo meteorite, marking it as a product of cosmic events rather than geological processes alone.

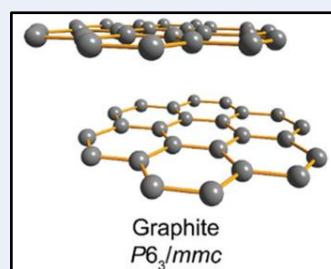
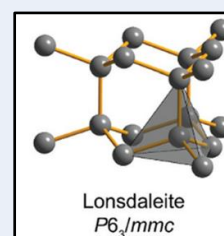
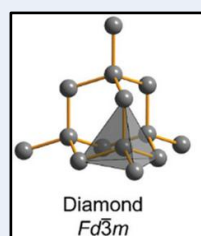
For many years, scientists debated whether hexagonal diamond was truly a distinct form or simply a defect-rich variation of cubic diamond. However, advances in characterization techniques such as transmission electron microscopy have confirmed its **hexagonal crystal lattice**, distinguishing it from the cubic structure of conventional diamond (2). This seemingly small difference in atomic arrangement leads to remarkable changes in physical properties.

One of the most exciting aspects of hexagonal diamond is its potential strength. Theoretical studies suggest that it could be significantly harder than regular diamond, with some estimates proposing up to 50–60% greater resistance under specific conditions (3). Recent experimental research has also demonstrated that similar structures can be formed under shock compression, mimicking the conditions of meteorite (4). Although large-scale synthesis remains a challenge, the possibility of producing such a material has generated considerable interest in materials science.

If successfully developed, hexagonal diamond could have wide-ranging applications, including ultra-durable cutting tools, advanced aerospace materials, and high-performance electronic components. What was once a rare material

found in meteorite fragments could eventually become part of everyday technology.

Beyond its scientific significance, this discovery offers a simple yet powerful insight. Coal, diamond, and hexagonal diamond are all composed of the same element—carbon—yet they differ dramatically in strength and properties. The key difference lies not in their composition, but in how their atoms are arranged. It is not just the substance, but the structure that defines strength.



Crystal structures of diamond, graphite and lonsdaleite, the hexagonal form of diamond (5)

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## The Microbial You: Rethinking What It Means to Be You

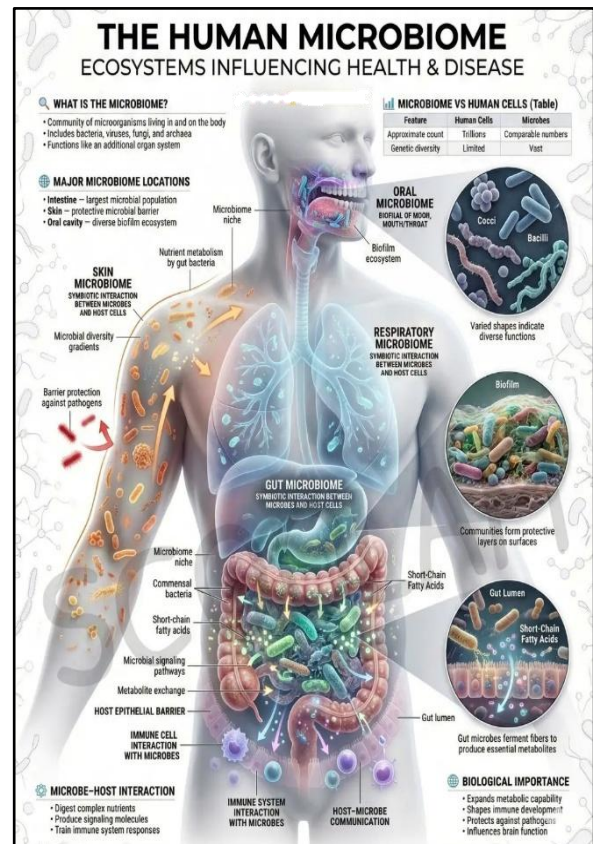
Mr. Manoj Kumar B S  
CSIR Fellow

The relationship between the human host and its resident microbial populations represents a remarkable example of biological co-evolution. Traditionally, humans were viewed as independent organisms, with microbes considered primarily as harmful pathogens. However, advances in microbiology and genomics have transformed this perspective, revealing that the human body functions as a “holobiont”—a complex system composed of human cells and a vast community of microorganisms, including bacteria, archaea, fungi, and viruses. Together, these organisms form the microbiome, often described as a “second genome” that provides essential metabolic, physiological, and immunological functions beyond those encoded by human DNA. From birth, microbial colonization plays a crucial role in shaping human development. Factors such as mode of delivery and early nutrition, especially breastfeeding, influence the establishment of the infant microbiota. These early interactions are vital for immune system maturation, metabolic programming, and neurological development. At the core of this relationship lies homeostasis, a dynamic balance in which host and microbes coexist beneficially.

The gut microbiome, the most densely populated microbial ecosystem, is central to this interaction. It aids in digesting complex dietary components like dietary fibres, which are fermented into short-chain fatty acids (SCFAs) such as acetate, propionate, and butyrate. These metabolites act as energy sources, regulate inflammation, and influence gene expression, thereby maintaining metabolic and intestinal health.

Beyond metabolism, the microbiome provides protection through colonization resistance. By occupying ecological niches and competing for nutrients, beneficial microbes prevent the growth of pathogens. They also produce antimicrobial compounds, strengthening host defence. Additionally, microbial signals help train the immune system to distinguish between harmless and harmful stimuli, highlighting their role in immune development.

Microbial influence extends beyond the gut through systems like the gut-brain axis. Gut microbes produce neuroactive compounds such as



serotonin and GABA, influencing mood, cognition, and behaviour. Similarly, the gut-lung and gut-skin axes demonstrate how microbial balance impacts respiratory and skin health.

Disruption of this balance, known as dysbiosis, is linked to diseases such as obesity, diabetes, cardiovascular disorders, and cancer. Consequently, therapeutic strategies like probiotics, prebiotics, and faecal microbiota transplantation aim to restore microbial balance.

In conclusion, humans are not solitary organisms but complex ecosystems shaped by their microbes. Understanding this relationship marks a transformative shift in medicine, opening pathways for personalized and effective healthcare.

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Why are skeletons afraid to fight their enemies?? Because they don't have the “guts”!



## Oncolytic Virotherapy: An Emerging Immunotherapeutic Strategy for Glioblastoma

Dr. Ritu Kudarha  
Assistant Professor, DBR

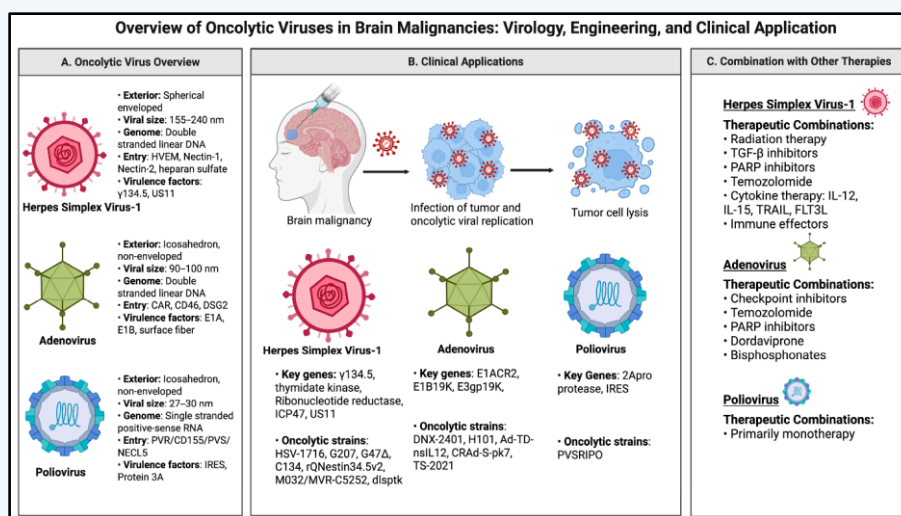


Figure 1: An overview of oncolytic viruses in brain malignancies: virology, engineering, and clinical applications [1]

**Glioblastomas (GBM)** are the most aggressive type of primary brain tumor with poor survival (14–16 months) despite the Stupp protocol (surgery + radiotherapy + temozolomide (TMZ)) because of tumor heterogeneity, diffuse infiltration, and therapeutic resistance. Recurrence is almost universal, emphasizing the need for novel therapies and treatment strategies. The most current area of treatment is immunotherapy, which includes immune checkpoint inhibitors, vaccinations, oncolytic virotherapy, and chimeric antigen receptor T-cells (CAR-T). Oncolytic virotherapy (OVT), which combines direct tumor cell destruction with immune activation, is one of them that shows promise. Oncolytic viruses (OVs) are genetically modified to proliferate only in tumor cells and kill them while leaving healthy tissue intact. In addition to directly oncolyzing tumor cells, OVs also induce tumor cell lysis, which releases tumor antigens and activates the host's immune system, creating a dual anti-tumor strategy that may prevent recurrence. Adenovirus (DNX-2401), herpes simplex virus (G47 $\Delta$ , G207), poliovirus (PVS-RIPO), measles virus (MV-CEA), reovirus (pelareo-rep), vaccinia virus (Pexa-Vec), and vesicular stomatitis virus (VSV-GP) are among the viral back bones that have progressed to clinical testing. With early trials showing safety and indications of long-term benefit, especially in combination regimens, the approval of G47 $\Delta$  for malignant glioma in Japan is a significant milestone. The focus of current research is on modifying viral genomes to improve immune activation, selectivity, and clearance resistance while investigating synergistic combinations

with immune checkpoint inhibitors, chemotherapy, radiation, and tumor-treating fields. OVs of the next generation are being developed to function as multifunctional immunomodulators, directly expressing ICIs, GM-CSF, or IL-12 within the TME. Advances in synthetic biology now facilitate customized virus design based on antiviral gene expression, patient immunity and tumor receptor profiles. Combining OVs with cell-based immunotherapies (CAR-T, dendritic-cell vaccines), BBB-modulating technologies (FUS), or oncolytic-nanoparticle hybrids may result in highly targeted, reproducible therapeutic approaches. Real-time tracking of viral transmission and immune activation may be aided by artificial intelligence and imaging biomarkers. Adopting the RANO2.0 and iRANO frameworks will be essential for reliably assessing responses and differentiating between actual recurrence and pseudo-progression. With these new paths, OVT has the potential to revolutionize GBM treatment by bridging immuno-oncology, neuro-oncology, and precision virology into a single therapeutic area.

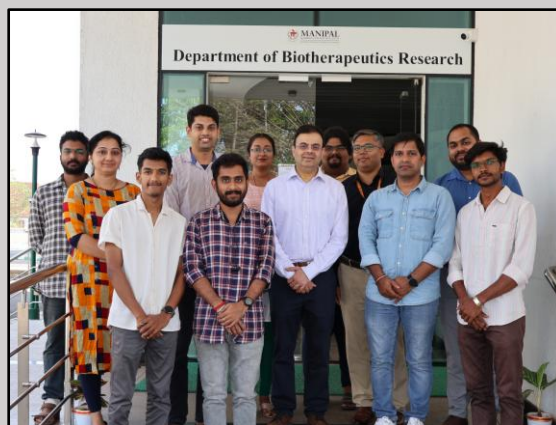
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# NOTABLE VISITORS



Prof. Neel Sarovar Bhavesh at the International Centre for Genetic Engineering and Biotechnology, New Delhi



Prof (Dr.) Jimmy K Limdi from Northern Care Alliance NHS Foundation Trust, University of Manchester, UK

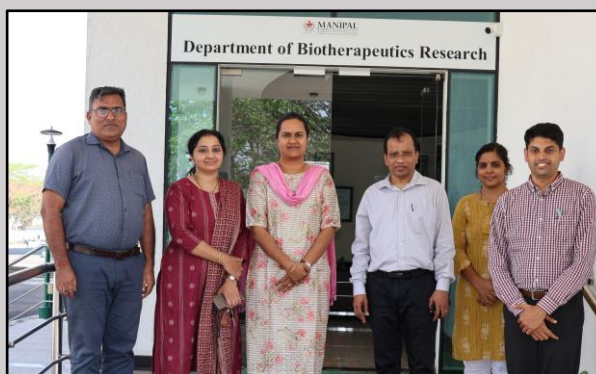


Dr. Anusha Epparla, Scientist-C at Central Manufacturing Technology Institute, Bengaluru



Dr. Karthik Subramanian, Scientist E-I at the BRIC Rajiv Gandhi Centre for Biotechnology, Trivandrum, Kerala

Dr. Bidyadhar Das, Associate Professor at North-Eastern Hill University, Meghalaya





# FUN MOMENTS



## Holi Celebrations



## Zumba Sessions



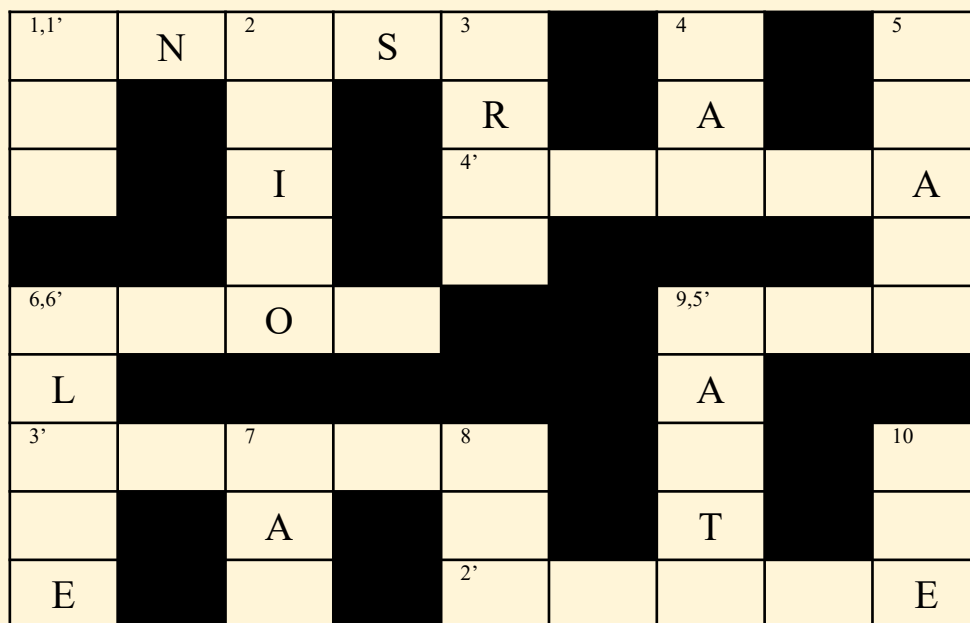
## Birthday Celebrations



Once upon a time, Alberto Perez forgot his aerobics music during a dance class. He decided to use Latin music instead and thus created the dance fitness form called, Zumba!

# CROSSWORD

✓ Fill in the biological terms using the clues provided below



✓ Clues:

## Down

- Soluble substance that stains cells & tissues
- Group present in the end terminus of a peptide
- Geological time-period
- One of the five sensory organs
- Helps in the circulation of blood
- Photosynthetic aquatic organism
- Co-enzyme in the citric acid cycle
- Three-letter code of an amino acid
- Text file format in bioinformatics
- A tailless primate belonging to Hominidae

## Across

- Digests DNA
- Digests RNA
- Functional regions of the genome
- Largest artery in the body
- Macronutrients specifically, a lipid consists of glycerol and fatty acids
- Long projections of neuron



Have you ever observed a small yellow box just next to the Eshwar Nagar Bus Stand near Bigg Boss? It still has the words "Forest Gate" painted on it, because many years ago, Manipal was a lush green jungle!



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**For general correspondence, such as letters to  
the editor. Contact us at:**

Department of Biotherapeutics Research  
Manipal Academy of Higher Education  
DBR Building, Behind 10<sup>th</sup> Block MIT Hostel,  
Manipal- 576 104, Karnataka, India  
Email: [mcbr.mahe@manipal.edu](mailto:mcbr.mahe@manipal.edu)  
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