



BIONews

Jan-June 2025

Connecting discoveries, innovations & the world of biosciences

VIT Spotlight

-Awards, patents, new research & leadership from SBST

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INDIA IN FOCUS

-Key national science and biotech news

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GLOBAL BIOSCIENCE

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Greetings from the Department of Biotechnology

It is a pleasure to introduce BIONews, capturing the spirit of discovery, innovation, and excellence at the School of Biosciences and Technology, VIT Vellore. This edition brings together notable achievements, breakthroughs, and developments from January to June 2025, celebrating the contributions of our students, faculty, researchers, and the wider scientific community.

May BIONews inspire curiosity, encourage innovation, and foster a deeper appreciation for the transformative power of biosciences.

Dr. Suneetha V
Dean, SBST



45 HOURS OF BIO-INSPIRED INNOVATION

BIDFest 2025 | 24-26 March

10th Edition • 4th National Event

Where biology meets design, technology and sustainability.

SBST's 10th Bioinspired Design Fest brought together biomimicry, sustainability, AI, IoT and design to transform ideas inspired by nature into real-world solutions.

"Everything is theoretically impossible, until it is done."

-ROBERT A. HEINLEIN

Vellore Institute of Technology

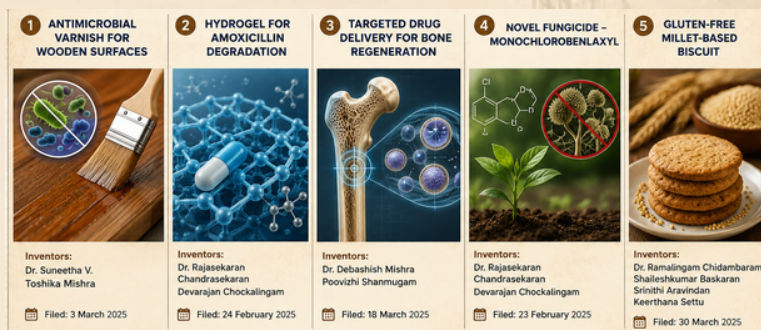
₹1.45 CRORE IN NEW RESEARCH FUNDING

SBST researchers secured three major research grants in early 2025, with a combined value of ₹1.45 crore. Dr. Reena Rajkumari B. and Dr. Balaji Balakrishnan received ₹35.63 lakh from ICMR to study microbiome metabolites and immune modulation in asthma. Dr. Sunantha G. and Dr. Dhanya V. received ₹53 lakh from DST-WTC for a rapid PFOS detection sensor. Dr. K. Deepankumar received ₹56 lakh from ANRF for targeted diabetic wound healing using miR146a-loaded exosomes.



FROM RESEARCH TO PATENTS

SBST researchers continued translating scientific ideas into intellectual property during the first half of 2025. Among the innovations were an antimicrobial varnish for wooden surfaces, a reduced graphene oxide-polyoxometalate hydrogel for amoxicillin degradation, a bone-targeted pharmaceutical composition, a novel fungicide, and a gluten-free millet-based biscuit formulation.



RESEARCH EXCELLENCE RECOGNISED

Many SBST research scholars and faculty earned recognition at national scientific forums in 2025. One such placeholder is the research scholar Animish Andhere who, under the guidance of Dr. M. A. Jayasri, received a Best Paper Award with a cash prize for his presentation on phytomolecules and phytotherapy at NHPS-2025, University of Kerala.



A NEW HUB FOR ADVANCED BIOSCIENCE

Central Instrumentation Laboratory II inaugurated at VIT by Chancellor Dr. G. Viswanathan on 27 March 2025 at SMV-124A.



INTEGRATING AI WITH HEALTHCARE GLOBALLY

On 21 April 2025, VIT's International Relations Office and the School of Bio Sciences and Technology (SBST) hosted Prof. Tom Luk R. Michoel from the University of Bergen, Norway, for a session on "Intelligent Systems for Risk Prediction and Diagnosis of Non-Communicable Diseases."

Funding secured

1.45+ Crores

PhD Graduates

33

Publications

297

Patents Published

12

National News

January:

India Approves Its Second CAR-T Cell Therapy, Qartemi

Immuneel Therapeutics' Qartemi, a personalised CAR-T therapy for adult B-cell non-Hodgkin lymphoma, received regulatory approval. It became India's second CAR-T therapy and demonstrated an 83.3% overall response rate in its Phase II trial.



India Highlights Cell and Gene Therapy as a Major Future Biotechnology Sector

At the 27th PM-STIAC meeting, experts highlighted the potential of cell and gene therapies for India's large burden of genetic diseases and cancer. The Genome India Project was identified as an important foundation for developing more personalised therapies.



March:

MTBVAC: A New Tuberculosis Vaccine Enters Indian Clinical Testing

Bharat Biotech began clinical testing of MTBVAC, a live-attenuated TB vaccine candidate developed from a human strain of *M. tuberculosis*. Unlike BCG, which originated from *M. bovis*, MTBVAC represents a fundamentally different vaccine platform and is being tested in Indian adults and adolescents.



The India Bioeconomy Report 2025 put India's bioeconomy at approximately \$165.7 billion in 2024, compared with around \$10 billion in 2014. That's roughly a 16-fold increase in a decade, making biotechnology an increasingly significant component of India's industrial economy



February:

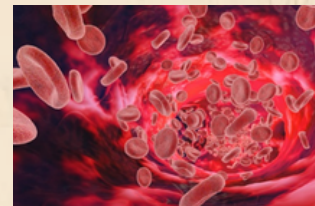
Bharat Cancer Genome Atlas Builds a Large Indian Breast-Cancer Genomic Dataset

IIT Madras's cancer-genomics work brought together whole-exome data from 480 breast-cancer patients, representing 960 whole-exome sequences, to create an Indian cancer-genomics resource. The objective is to identify genetic patterns specific to Indian patients and improve precision oncology.



India Advances Toward Human Gene Therapy for Haemophilia

The stem-cell and gene-therapy programme at CMC Vellore/BRIC-inStem progressed toward India's first human gene-therapy clinical work for haemophilia. The approach uses lentiviral-vector-modified blood stem cells to provide a functional copy of the Factor VIII gene, potentially replacing repeated clotting-factor treatment with a much more durable intervention.



April:

India Conducts Its First Human Gene-Therapy Trial for Haemophilia A

BRIC-inStem and CMC Vellore conducted India's first-in-human gene-therapy trial for haemophilia A using genetically modified hematopoietic stem cells and a lentiviral vector.



IIT Madras researchers develop a potential combination strategy against triple-negative breast cancer

Researchers in the Department of Biotechnology at IIT Madras published work in *Molecular Cancer Therapeutics* investigating inhibition of PAK1, an oncogenic signalling kinase, alongside chemotherapy drugs against triple-negative breast cancer. The work explores whether simultaneously targeting tumour signalling and chemotherapy response can improve treatment effectiveness.

National News

May:

Bharat Biotech's Hillchol Successfully Completes Phase III Cholera Vaccine Trial

Bharat Biotech reported successful completion of Phase III trials for Hillchol, an oral cholera vaccine targeting both major V. cholerae serotypes, Ogawa and Inaba. The vaccine was tested across multiple age groups in India and represents another indigenous vaccine moving through the full clinical-development pipeline.



Indian Researchers Discover a Potential Weak Point in Antibiotic-Resistant Bacteria

Researchers from the Rajiv Gandhi Centre for Biotechnology, IIT Madras and TIFR identified the role of a specific bacterial porin, CymAKp, in allowing aminoglycoside antibiotics to enter Klebsiella pneumoniae. Understanding these membrane channels could provide a route for designing strategies to overcome antibiotic resistance.

June:

India's First Gene-Edited Sheep Is Born in Kashmir

Researchers at SKUAST-Kashmir produced India's first gene-edited sheep using CRISPR-based editing. The sheep reportedly showed about a 30% increase in muscle mass, demonstrating the potential of genome editing for livestock improvement and agricultural biotechnology.



Indian researchers uncover microbial diversity in a previously unexplored West Bengal hot spring

A June Molecular Biology Reports study characterised microbial communities from the Kharasinpur hot spring in West Bengal, an environment that had previously received little microbiological investigation. Seven bacterial isolates were obtained and characterised using morphological, biochemical and 16S rRNA approaches, highlighting another potential reservoir of thermophilic microbes with biotechnological applications.

International News

January:

CRISPR enzymes engineered to evade the human immune system

Researchers from the Broad Institute and Cyrus Biotechnology engineered modified Cas9 and Cas12 enzymes that were less recognizable to the immune system. In mice, the redesigned enzymes retained gene-editing activity while provoking reduced immune responses, potentially addressing one of the major barriers to repeated CRISPR-based therapies.



AI-designed proteins neutralize deadly snake venom

Researchers used deep-learning protein-design tools to create entirely new proteins that bind three-finger toxins from cobra and other elapid venoms. The designed proteins neutralized toxins in vitro and protected mice from lethal toxin challenges, with some experiments showing 80–100% survival. This demonstrates that AI-designed proteins could eventually provide a cheaper, more broadly accessible alternative to conventional antibody-based antivenoms.

March:

Engineered nasal bacteria deliver drugs toward the brain

Researchers engineered a naturally occurring nasal bacterium, *Lactobacillus plantarum*, to exploit the olfactory route into the brain.

After administration, the bacteria accumulated around the olfactory epithelium and subsequently reached the olfactory bulb and other brain regions, demonstrating a potential biological solution to the blood-brain barrier problem.



First inhaled lentiviral gene therapy enters cystic fibrosis clinical testing

A lentiviral gene-therapy approach was moved toward treating cystic fibrosis through inhaled delivery, aiming to introduce functional genetic material directly into lung cells. This represents an alternative to systemic administration for diseases affecting a specific organ.

February:

Heat-resistant rice developed without sacrificing yield

Researchers identified a molecular pathway involving the transcription factor NAT1 and wax biosynthesis that controls rice thermotolerance. Genetically modified NAT1 loss-of-function rice showed improved heat tolerance, and field trials in two additional rice varieties confirmed the improvement without yield penalties.



Engineered adipose cells used to starve tumours

Researchers developed an approach called adipose manipulation transplantation (AMT). Instead of directly attacking tumour cells, they engineered adipocytes so that they would compete with tumours for essential metabolic resources. In mouse cancer models, the engineered adipocytes suppressed tumour growth.

April:

Human liver organoids developed with functional metabolic activity

Researchers generated human hepatocyte organoids capable of long-term self-renewal while maintaining hepatic identity and metabolic functions. Activation of specific Wnt and STAT3 signaling pathways helped maintain the cells and their liver-like properties.

Wildflowers found to remove nickel from contaminated soil

Researchers investigated plants capable of accumulating nickel from contaminated environments, providing insight into biological approaches for cleaning heavy-metal-polluted soils.

Nickel	
atomic number	28
symbol	Ni
electron configuration	[Ar]3d ⁸ 4s ²
name	nickel
atomic weight	58.6934
acid-base properties of higher-valence oxides	
crystal structure	
physical state at 20 °C (68 °F)	
Transition metals	Solid
Face-centred cubic	Weakly basic

International News

May:

Gut-derived peptide provides protection against citrus greening disease

Researchers studying citrus plants resistant to Huanglongbing (HLB) identified a regulatory pathway involving PUB21 and MYC2 that controls plant immune responses.

The study showed how the pathogen manipulates this pathway to suppress plant immunity, revealing a potential route for developing disease-resistant citrus.



Self-assembling protein nanoparticles deliver molecules directly into cells

Researchers developed nanoparticles built from engineered protein components capable of self-assembly and designed to facilitate cytosolic delivery of nucleic acids and proteins.

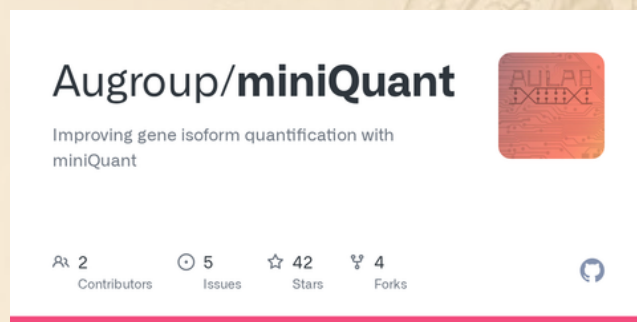
The approach tackles one of the biggest problems in intracellular delivery: getting large biological molecules past the cell membrane and, especially, the endosomal barrier.

June:

Machine learning improves identification of human gene isoforms

Researchers developed miniQuant, a machine-learning method that combines long- and short-read sequencing data to improve the quantification of gene isoforms.

This helps address a major problem in transcriptomics: determining which RNA variants are actually present and in what quantities.



Note from the Editors:

As we close this edition of BIONews, we celebrate the ideas, achievements, and discoveries shaping SBST. We hope these stories inspire curiosity and bold exploration in biosciences.

With Best Wishes,

Programme Representatives

(Rakshita Saraogi 25BBT0184

Nikil S 25BBT0087)

SBST (B. Tech. Biotechnology)

VIT Vellore

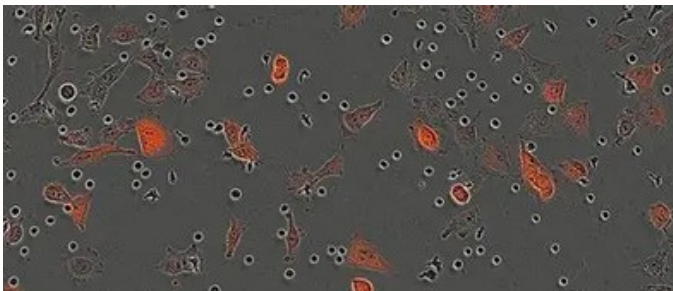
BIONEWS

Recent innovations in the field of biotechnology and food technology
from July to December 2025

AI-ASSISTED DESIGN OF CANCER-FIGHTING PROTEINS

Institutions: Technical University of Denmark
and Scripps Research

Researchers from the Technical University of Denmark and Scripps Research developed an AI-based approach for designing protein minibinders that can recognize specific targets on cancer cells. The technology combines artificial intelligence with protein engineering to design customized biological molecules. Laboratory studies demonstrated the potential of these molecules to assist T cells in recognizing and attacking cancer cells.



Bacteria with a Redesigned Genetic Code

Scientists successfully engineered bacteria with a substantially redesigned genetic code, demonstrating that the genetic instructions used by living organisms can be modified on a large scale.

The research could support the development of microorganisms capable of producing novel proteins and valuable chemicals. It also has potential applications in synthetic biology, biotechnology and biological containment.



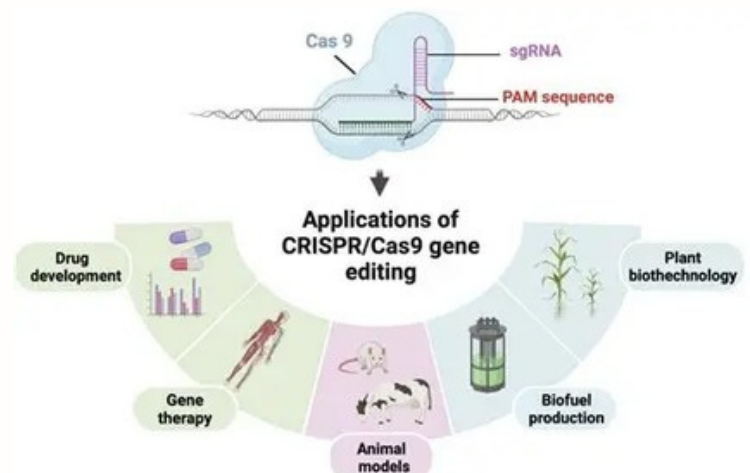
CRISPR Systems with Improved Control

Institutions: MIT/Broad Institute-associated
researchers

Researchers developed a protein-based system capable of controlling CRISPR-Cas9 activity. Anti-CRISPR proteins were used as an “off switch” to regulate gene-editing activity.

Importance:

Better control of CRISPR could help reduce unintended genetic changes and improve the safety and precision of future gene-editing therapies.



Large-Scale Food Safety Database

Researchers developed the Comprehensive European Food Safety (CHEFS) database, bringing together hundreds of millions of analytical measurements from millions of food samples.

The data covers areas such as:

- Pesticide residues
- Chemical contaminants
- Veterinary-drug residues
- Food-safety measurements

Large databases can be combined with machine learning and artificial intelligence to improve food-safety monitoring, contamination prediction and risk assessment.

BIONEWS

Conversion of Food Waste Sustainable Protein

Researchers investigated the use of restaurant food waste as a substrate for precision fermentation. Microorganisms can convert suitable organic materials into valuable products such as protein and other functional ingredients.

Process concept:

Food waste → microbial fermentation → biomass/protein → food ingredient.

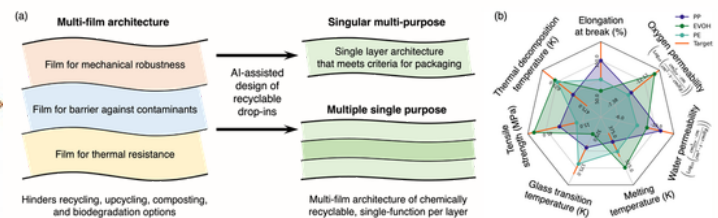
The approach addresses two major global challenges simultaneously—food waste and increasing demand for sustainable protein. It could potentially be applied to alternative meat, nutritional products and functional foods.

AI-Assisted Discovery of Recyclable Packaging Materials

Institutions: Georgia Institute of Technology and collaborators

Researchers used machine learning and polymer informatics to screen millions of possible polymer structures for desirable properties. The approach helped identify polymers with promising barrier properties and chemical recyclability.

AI-assisted polymer discovery can accelerate the development of recyclable food-packaging materials while reducing conventional trial-and-error experimentation



Programmable Microbiome Engineering

Research Area: Synthetic biology and microbiome engineering

Researchers continued developing methods for genetically modifying microorganisms within complex microbial communities, including microorganisms associated with the human gut. The technology could eventually support the development of next-generation probiotics, synbiotics, personalized nutrition and microbiome-based therapies.



CRISPR-Assisted Fungal Protein Production

Researchers used CRISPR gene editing to improve a protein-producing fungus. The modified microorganism was designed to improve growth and protein-production efficiency.

This technology has potential for producing mycoprotein and other fermentation-based alternative proteins, providing a possible sustainable alternative to conventional animal protein.

Vedika S Panicker(24MFI0002)
Akshaya K (24MFI0043)
UNDER GUIDENSE OF:
Dr.SUNEETHA V -SBST DEAN
VIT -VELLORE