20 YEARS OF EXCELLENCE

NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

Years in pursuit of
Excellence in Technical Education

DEPARTMENT OF BIOTECHNOLOGY

Department Profile | 2026



Email
biotech _hod@nitw.ac.in

Contact
+91 870-246 2718

Website
https://www.nitw.ac.in/biotechnology

DEPARTMENT OF BIOTECHNOLOGY

NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

20 YEARS OF EXCELLENCE

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20 YEARS OF EXCELLENCE

DEPARTMENT OF

BIOTECHNOLOGY

Excellence • Innovation • Integrity • Impact

Department of Biotechnology

BT

Biotechnology for a Better Tomorrow

VISION & MISSION

OUR VISION

To be a globally recognized Department of Biotechnology that excels in education, research and innovation, and contributes to the advancement of biotechnology for the benefit of society and the environment.

OUR MISSION

- To impart high-quality education and training in biotechnology and allied areas.
- To foster cutting-edge research and innovation to address global challenges.
- To translate scientific knowledge into sustainable solutions for societal and environmental well-being.
- To nurture ethical, responsible and socially conscious biotechnologists and leaders.



NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

Department of Biotechnology

Nurturing Talent | Advancing Research | Building Future

20 YEARS OF EXCELLENCE

Excellence in Technical Education

DEPARTMENT TIMELINE

Our journey of growth, innovation and impact in Biotechnology

2006
Department of Biotechnology established

2008
Ph.D. Programme in Biotechnology started

2012
Research activities and laboratories expanded

2015
Expansion of state-of the art facilities and collaborations

2020
M.Tech, Biotechnology Started

2025 onwards
Strengthening innovation, entrepreneurship and societal impact

KEY HIGHLIGHTS

- Strong Faculty Team
- Modern Laboratories & Infrastructure
- Quality Education & Training
- Active Research & Innovation
- Collaborations & Partnerships



DEPARTMENT OF BIOTECHNOLOGY

NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

20 YEARS OF EXCELLENCE

COURSES OFFERED

B.Tech. in Biotechnology

Undergraduate programme with a strong foundation in biological sciences and engineering.

M.Tech. in Biotechnology

Postgraduate programme specializing in advanced biotechnology and interdisciplinary research.

Ph.D. in Biotechnology

Research-driven doctorate programme fostaring innovation and scientific excellence.



Quality Education | Industry Relevant Curriculum | Research & Research Drives | Career Ready Graduates

Department of Biotechnology | NIT Warangal

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DEPARTMENT FACULTY



Prof. Asim Bikas Das

Specializations

- AI and Precision Medicine
- Computational Genomics
- Network Systems Biology



Prof. P. Sreenivasa Rao

Specializations

- Downstream Processing
- Enzyme Technology
- Metabolic Engineering
- Stem Cells, Biomaterials and Tissue Engineering



Prof. K. Narasimhulu

Specializations

- Environmental Biotechnology
- Modelling & Simulation of Bioprocesses
- Biofuels & Bioenergy
- Systems Biology



Prof. R. Satish Babu

Specializations

- Bioprocess Engineering
- Environmental Biotechnology
- Modeling and Simulation of Bioprocesses
- Metabolic Engineering
- Bioinformatics



Prof. Prakash Saudagar

Specializations

- Cancer & Infectious Diseases Drug Targets, Molecular Cell Biology & Protein Biochemistry



Prof. B. Rama Raju

Specializations

- Biomass conversion and Integrated Biorefineries
- Biomass to biomaterials for medical&industrial applications
- Metabolic Engineering of cells for Biofuels and Biochemicals



Prof. Onkara Perumal. P

Specializations

- AI&ML in Healthcare
- Diabetes Mellitus
- Functional Genomics
- Lichen sclerosus



Prof. V. Kohila

Specializations

- Protein Engineering, Immunoinformatics



Prof. Urmila Saxena

Specializations

- Biosensor for Medical Diagnostics
- Computational Genomics Data Analysis



Prof. Amitava Bandhu

Specializations

- Functional analysis of mycobacterial proteins
- Modelling, validation and structure-function of proteins
- Mycobacterial Gene Regulation

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DEPARTMENT FACULTY



Prof. Thyageshwar Chandran

Specializations

- Biomembranics
- Cancer Biology
- Computational Drug discovery and dynamics
- Molecular Biophysics
- Molecular Dynamics of Macromolecules
- Structural dynamics of ribosomes
- Structural Proteomics (X-ray Crystallography and Cryo-EM)



Prof. Perugu Shyam

Specializations

- Bioinformatics
- Cancer
- Computational Drug Design & Discovery
- Machine Learning & Artificial Intelligence



Prof. Anbumathi P

Specializations

- Cancer Systems Biology
- Cell Cycle Regulation
- Cyanobacteria
- Disease Maps
- Mathematical Modeling and Analysis of Biological Systems
- Metabolic Network Modeling Network Biology



Prof. Surajbhan Sevda

Specializations

- Bioenergy
- Biological Wastewater Treatment
- Novel bioenergy strategies, Bioelectrochemical Systems
- Resource Recovery from Waste
- Sustainable Waste Management



Prof. Ashish A Prabhu

Specializations

- Biofuels
- Bioprocess Engineering
- Biorefinery
- Downstream processing Technology
- Enzyme engineering
- Fungal Biotechnology
- Metabolic Engineering
- Therapeutic protein production



Prof. Soumya Lipsa Rath

Specializations

- AR/VR for Biomedical research
- Computational Biophysics
- DNA based simulations
- Drug designing
- ML and Diagnostics
- Molecular Modelling



Prof. Rathnaprabha D

Specializations

- Elicitation and Extraction of Potent Plant Novel Drugs(SM)
- Plant Biotechnology, Plant Tissue culture



Prof. M Jerold

Specializations

- Biofuels & Bioenergy
- Biomass Valorization
- Bioprocessing
- Biorefineries
- Wastewater Treatment



Prof. Chockalingam S

Specializations

- Cancer Biology
- Cell Signaling



Prof. Priya

Specializations

- Cell and molecular biology
- Epigenetics
- Fungal pathogenesis
- Microbial Gene regulation

DEPARTMENT TIMELINE

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Biotechnology for a Better Tomorrow

STUDENTS

Brilliant Minds. Bright Futures.

A vibrant and diverse student community driven by curiosity, innovation and excellence.

280+	51	60+	390+
B.Tech. Students	M.Tech. Students	Ph.D. Scholars	Total Strength (2025–26)



FACULTY

Inspiring Minds. Driving Excellence.

A team of experienced and research-oriented faculty committed to academic and research excellence.



20+	100%	10+	100+
Faculty Members	Ph.D. Qualified	Research Areas	Publications (2024–25)

STAFF

Supporting Excellence. Enabling Growth.

Dedicated and efficient staff ensuring smooth functioning of academic and research activities.

TECHNICAL STAFF (5 MEMBERS)



SUPPORTING STAFF (2 MEMBERS)



Technical Staff
Supporting research and laboratory activities

Administrative Staff
Ensuring smooth academic and administrative operations

Support System
Committed to a safe, conducive and sustainable environment

Holistic Development
Encouraging innovation, leadership and teamwork beyond the classroom.

Research Exposure
Hands-on experience through projects, labs and collaborations.

Achievements
Students and faculty recognized at national and international levels.

Mentorship
Guidance that nurtures curiosity and shapes successful careers.

Collaborative Culture
A vibrant ecosystem of learning, research and mutual growth.



NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

Department of Biotechnology

Nurturing Talent | Advancing Research | Building Future

20 YEARS OF EXCELLENCE

FACILITIES & INFRASTRUCTURE

WELL EQUIPPED LABORATORIES



Modern and well-maintained laboratoties with state-of-the-art equipment to support teaching, learning and research.

ADVANCED INSTRUMENTATION



Access to advanced analytical and bioprocessing instruments for cutting-edge research and innovation.

RESEARCH & INNOVATION



A vibrant research environment fostering innovation, interdisciplinary collaboration and societal impact.

LIBRARY & LEARNING RESOURCES



Well-stocked library with journals, e-resources and digital facilities to support academic excellence and lifelong learning.

COMPUTATIONAL FACILITIES



High-performance computing facilities and licensed software for data analysis, simulation and bioinformatics.

KEY EQUIPMENT



qPCR System



FPLC System



Nucleic Acid Analyzer



Bioreactor System



Microplate Reader



CO_2 Incubator Shaker



Laminar Air Flow

Enabling advanced research, innovation and high-quality outcomes

INFRASTRUCTURE HIGHLIGHTS

- Spacious Classrooms & Seminar Halls
- 24x7 Power Backup
- High-Speed Internet
- Purified Water Supply
- Green & Sustainable Campus
- Safety & Security Infrastructure

BY THE NUMBERS

10+ Research Areas	**100+** Publications (2024-25)
10+ Laboratories	**20+** Collaborations & MOUs

Innovation | Integrity | Excellence | Collaboration | Sustainability



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20 Legacy of Excellence

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BT Biotechnology for a Better Tomorrow

MAJOR RESEARCH LABORATORIES

State-of-the-art laboratory facilities enabling cutting-edge biotechnology research and innovation

1 MOLECULAR BIOLOGY LABORATORY



- DNA & RNA Isolation
- PCR / RT-PCR
- Gel Electrophoresis
- Gene Cloning
- Gene Expression Analysis

2 CELL CULTURE LABORATORY



- Mammalian Cell Culture
- Primary Cell Culture
- Cell Viability Assays
- Drug Screening
- Therapeutic Studies

3 BIOINFORMATICS LABORATORY



- Molecular Docking
- Genomics Analysis
- Proteomics Analysis
- Systems Biology
- AI-Based Bioinformatics

4 DOWNSTREAM PROCESSING LAB



- Protein Purification
- Chromatography
- Filtration Technologies
- Process Scale-up
- Product Recovery & Formulation

5 BIOPROCESS ENGINEERING LAB



- Fermentation Technology
- Scale-up Studies
- Bioreactor Operation
- Process Optimization
- Industrial Applications

6 ANALYTICAL INSTRUMENTATION LAB



- Spectroscopy
- Sample Characterization
- Chromatography
- Precision Analytics
- Instrumental Analysis

10+ Specialized Laboratories

100+ Active Researchers

Advanced Research Infrastructure

Industry-Oriented Innovation & Technology Development

Innovation | Integrity | Excellence | Collaboration | Sustainability

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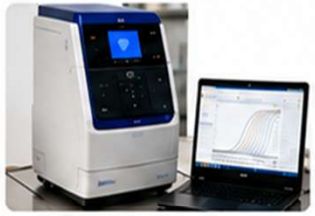
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MAJOR EQUIPMENT & INSTRUMENTATION

Advanced instrumentation supporting high-quality research across diverse areas of biotechnology

1 qPCR SYSTEM



Gene expression analysis, Real-time PCR

2 HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)



Separation, identification and quantification of compounds

3 GAS CHROMATOGRAPHY – MASS SPECTROMETRY (GC-MS)



Compound identification, metabolite profiling

4 FERMENTOR / BIOREACTOR



Microbial fermentation, process development

5 UV-VIS SPECTROPHOTOMETER



Quantitative analysis of biomolecules

6 FLUORESCENCE MICROSCOPE



Cell imaging, fluorescence observations

7 CO_2 INCUBATOR



Cell culture incubation under controlled conditions

8 LAMINAR AIR FLOW



Aseptic handling of cultures and samples

9 MICROPLATE READER



Absorbance, fluorescence and luminescence measurements

10 ULTRASONICATOR



Cell lysis, sample preparation and homogenization

20+ Major Equipment & Systems

High-End Characterization & Analysis Facilities

Dedicated Technical Support for Research Excellence

Enabling Innovation, Quality Research & Technology Development



Innovation | Integrity | Excellence | Collaboration | Sustainability

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Biotechnology for a Better Tomorrow

RESEARCH GROUPS & EXPERTISE

Exploring frontiers of biotechnology to address real-world challenges and drive innovation

CELLULAR & MOLECULAR SCIENCES



- Gene expression & regulation
- Protein engineering & function
- Cell signaling & therapeutics
- Structural & functional genomics

15+ Faculty & Researchers

COMPUTATIONAL BIOLOGY



- Bioinformatics & genomics
- Systems biology & modeling
- Molecular docking & simulations
- Data science in life sciences

10+ Computational Experts

ENVIRONMENTAL BIOTECHNOLOGY



- Bioremediation & waste valorization
- Water & wastewater treatment
- Microbial ecology & sustainability
- Environmental monitoring

12+ Active Researchers

INDUSTRIAL & APPLIED BIOTECHNOLOGY



- Fermentation & bioprocessing
- Enzyme & product development
- Metabolic engineering
- Biotechnology for industry

10+ Industry-focused Experts

TRANSLATIONAL & BIOMEDICAL RESEARCH



- Drug discovery & development
- Nanobiotechnology
- Diagnostics & biosensors
- Regenerative medicine

12+ Research Collaborators

OUR RESEARCH STRENGTHS

- Interdisciplinary Approach
- State-of-the-art Facilities
- Industry & Academic Collaborations
- Global Research Partnerships



IMPACT & OUTCOMES

- 100+ Publications (2024–25)
- 20+ Patents Filed/Granted
- 20+ Collaborations & MoUs
- 10+ Sponsored Projects

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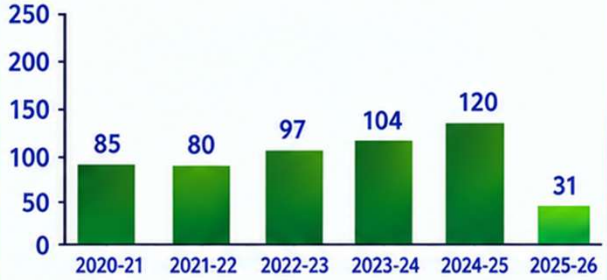
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Biotechnology for a Better Tomorrow

RESEARCH PORTFOLIO

Driving impactful research across diverse domains to address global challenges and societal needs

RESEARCH PUBLICATIONS



500+ Total Publications

RESEARCH FUNDING

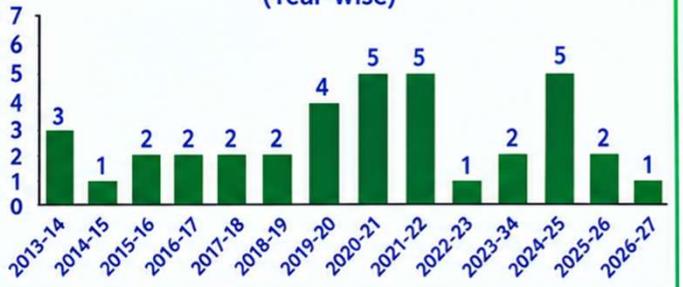
(2020–25)



25+ Research Grants Received

Ph.D. AWARDED

(Year-wise)



37 Total Ph.D. Degrees Awarded (2013-14 to 2026-27)

RESEARCH FOCUS AREAS

- Gene & Protein Engineering
- Bioprocess Engineering
- Structural Biology & Drug Discovery
- Environmental Biotechnology
- Computational & Systems Biology
- Synthetic Biology & Metabolic Engineering
- Nanobiotechnology & Biomaterials
- Plant Biotechnology & Secondary Metabolites
- Diagnostics & Biosensors

RESEARCH IMPACT

- Addressing healthcare, agriculture, environment and sustainable development challenges
- Interdisciplinary solutions with societal relevance and industrial applications
- Strengthening national priorities: Atmanirbhar Bharat, Make in India, and SDGs
- Strong industry connect and technology translation for real-world impact

OUR PARTNERS & FUNDING AGENCIES

DBT
Department of Biotechnology Government of India

iSERB INDIA
Science and Engineering Research Board (SERB)

ANRF
Anusandhan National Research Foundation (ANRF)

DST
Department of Science & Technology (Govt)

10+ MoUs (National & International)

Innovation | Integrity | Excellence | Collaboration | Sustainability



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Legacy of Excellence

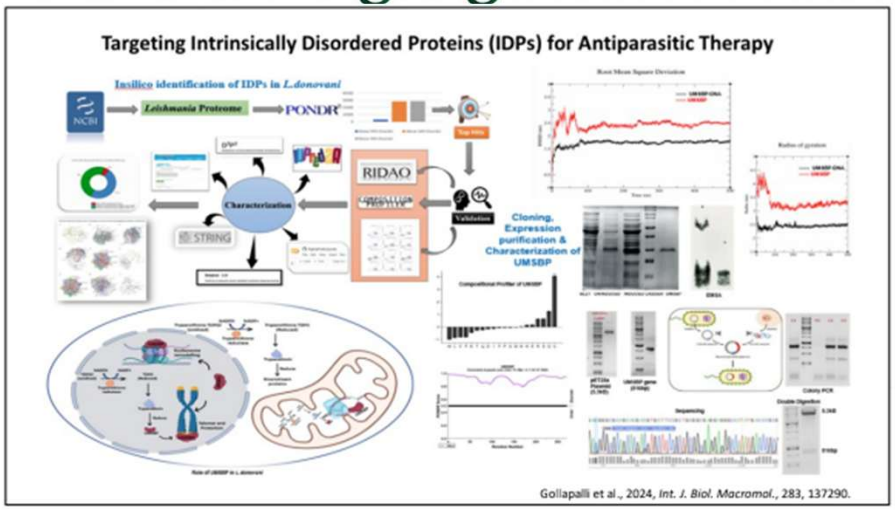
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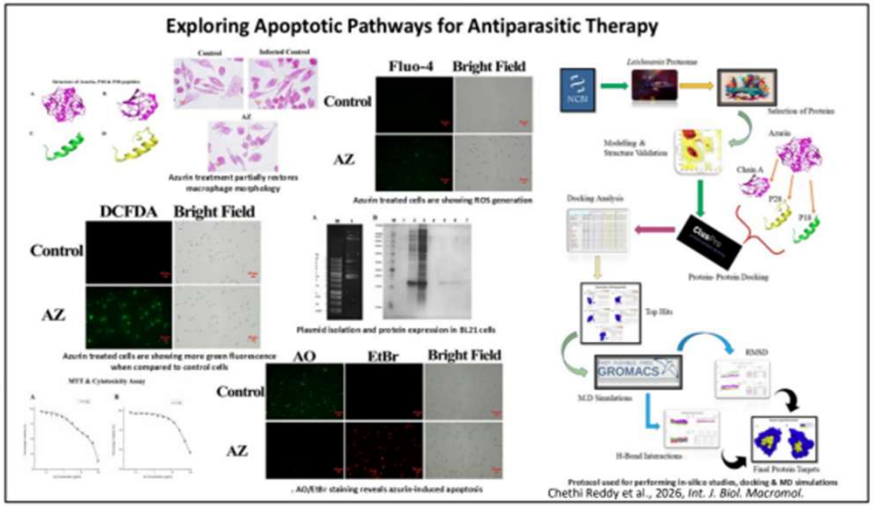
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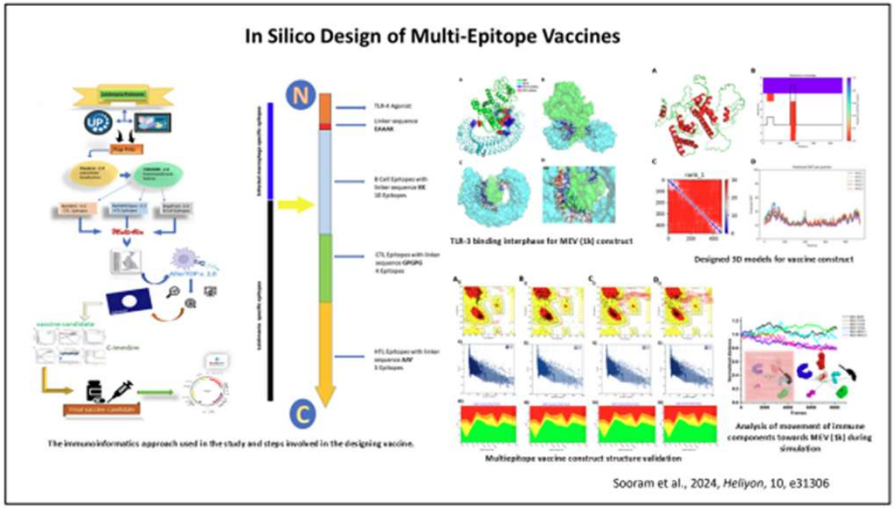
Research Highlights



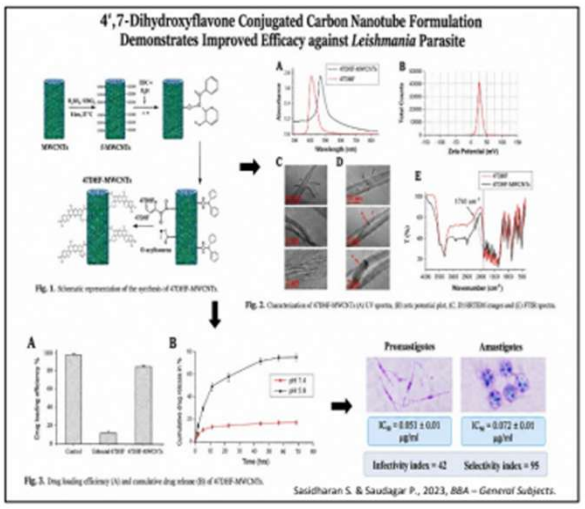
Gollapalli et al., 2024, *Int. J. Biol. Macromol.*, 283, 137290.



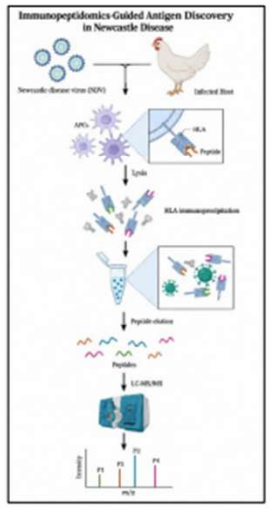
Chethi Reddy et al., 2026, *Int. J. Biol. Macromol.*



Sooram et al., 2024, *Heliyon*, 10, e31306



Sasidharan S. & Saudagar P., 2023, *BBA – General Subjects.*



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Biotechnology for a Better Tomorrow

Research Highlights

Integrated Biorefinery Research Laboratory (IBRL)

Engineering Renewable Biomass into Sustainable Products through Enzymes, Microbial Cell Factories and Digital Biorefineries

From Waste to Wealth

Renewable Biomass Resources

Green Biomass
(Lignocellulosic & Agricultural Residues)


Corncob


Rice straw


Agro-residues


Wood / Forest residues

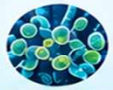

Other biomass

Blue Biomass
(Algae & Marine Resources)


Seaweed


Algae


Alginate


Marine-associated microbiomes

1. Biomass Valorization & Sustainable Pretreatment



- Characterization & fractionation
- Acid/alkali & emerging technologies
- Inhibitor reduction
- Fermentable sugars

2. Enzyme Discovery & Biocatalysis

- Cellulases, hemicellulases
- Ligninolytic enzymes
- Alginate lyases
- Extremozymes & halotolerant enzymes
- Metagenomics & functional genomics
- Enzyme engineering



3. Metabolic & Synthetic Biology

- Engineered microbial cell factories
- Pathway optimization
- Yeast / *E. coli* engineering
- Biofuels & biochemicals
- Isoprenoids & valuable products



4. Biomass-to-Biomaterials & Bioproducts

- Biopolymers & bioplastics
- Prebiotics & bioactive compounds
- Functional & biomedical materials
- Tissue engineering materials



5. AI/ML & Digital Biorefinery

- Biomass characterization
- Enzyme & pathway prediction
- Process optimization
- Techno-economic & life-cycle analysis
- Digital twin models



6. Blue–Green & Circular Biorefinery

- Integrated biomass platforms
- Waste-to-value systems
- Zero/low waste
- Circular bioeconomy



Integrated Biorefinery Research Laboratory (IBRL)

Sustainable Products

- **Biofuels** *(ethanol, biodiesel, advanced biofuels)*
- **Biochemicals** *(organic acids, platform chemicals)*
- **Bioplastics** *(PHA, PLA, biodegradable polymers)*
- **Prebiotics** *(functional food ingredients)*
- **Biomaterials** *(tissue engineering, medical applications)*
- **Value-added Products** *(enzymes, nutraceuticals, bioactive compounds)*



IBRL AT A GLANCE

- **33** Publications (12 Journal | 10 Conference 10 Book Chapters | 1 Textbook)
- **1** Patent Published
- **5** Projects / Consultancy
- **2** Ongoing Projects
- **2** Completed Research Projects
- **1** Completed Consultancy
- **5** Ph.D. Scholars (2 current + 3 awarded)

Google Scholar
2228 Citations | h-index **26**

Research Focus

Lignocellulosic Biorefinery | Blue-Green Biorefinery | Metagenomic Enzyme Discovery | Enzyme Engineering | Metabolic Engineering | Biomaterials & Bioproducts | AI/ML & Digital Twins | Circular Bioeconomy

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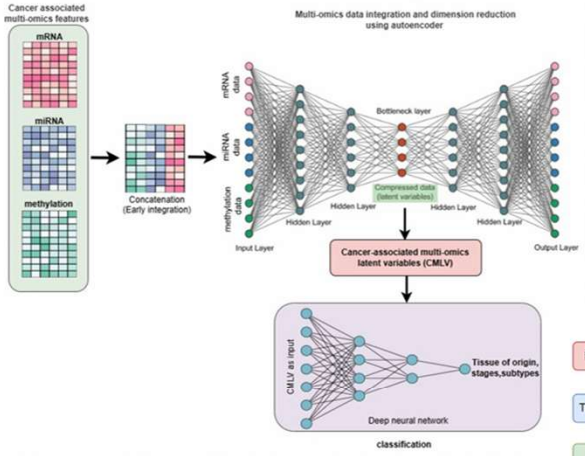
Research Highlights

AI, omics, Network Medicine & Precision Oncology

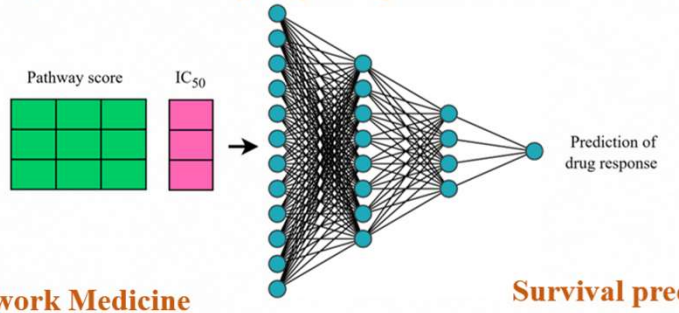
cGenomics Lab

Asim Bikas Das, Associate Professor

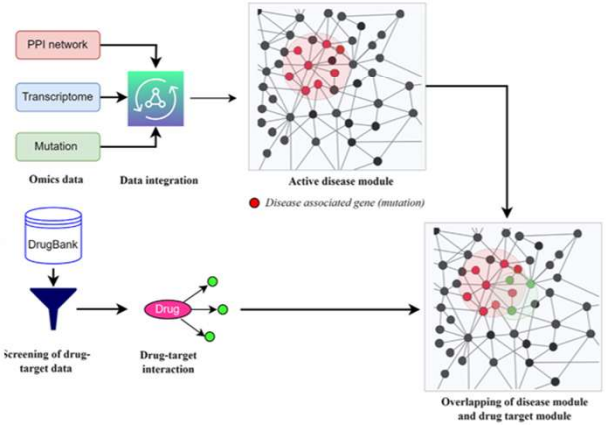
Multi-omics and diagnosis



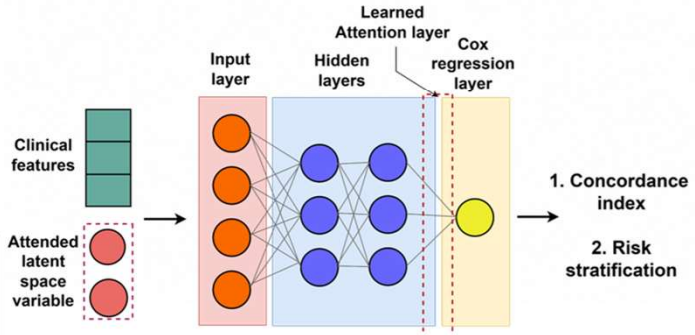
AI, omics and Drug response prediction



Network Medicine



Survival prediction with AI



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Legacy of Excellence

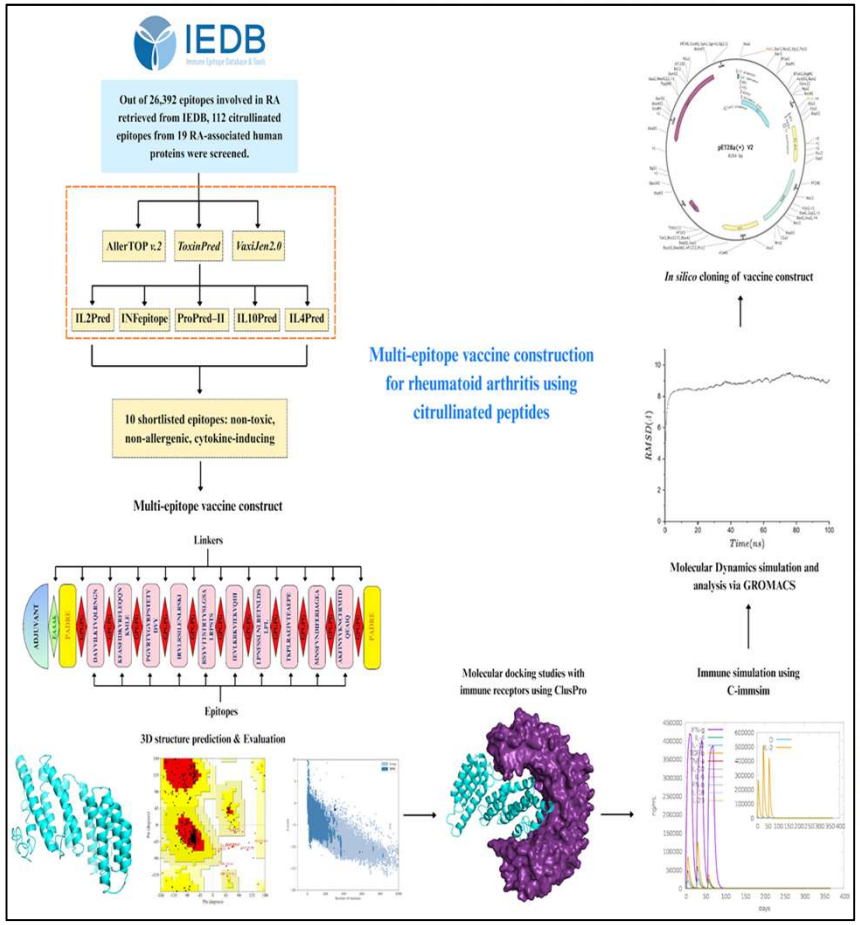
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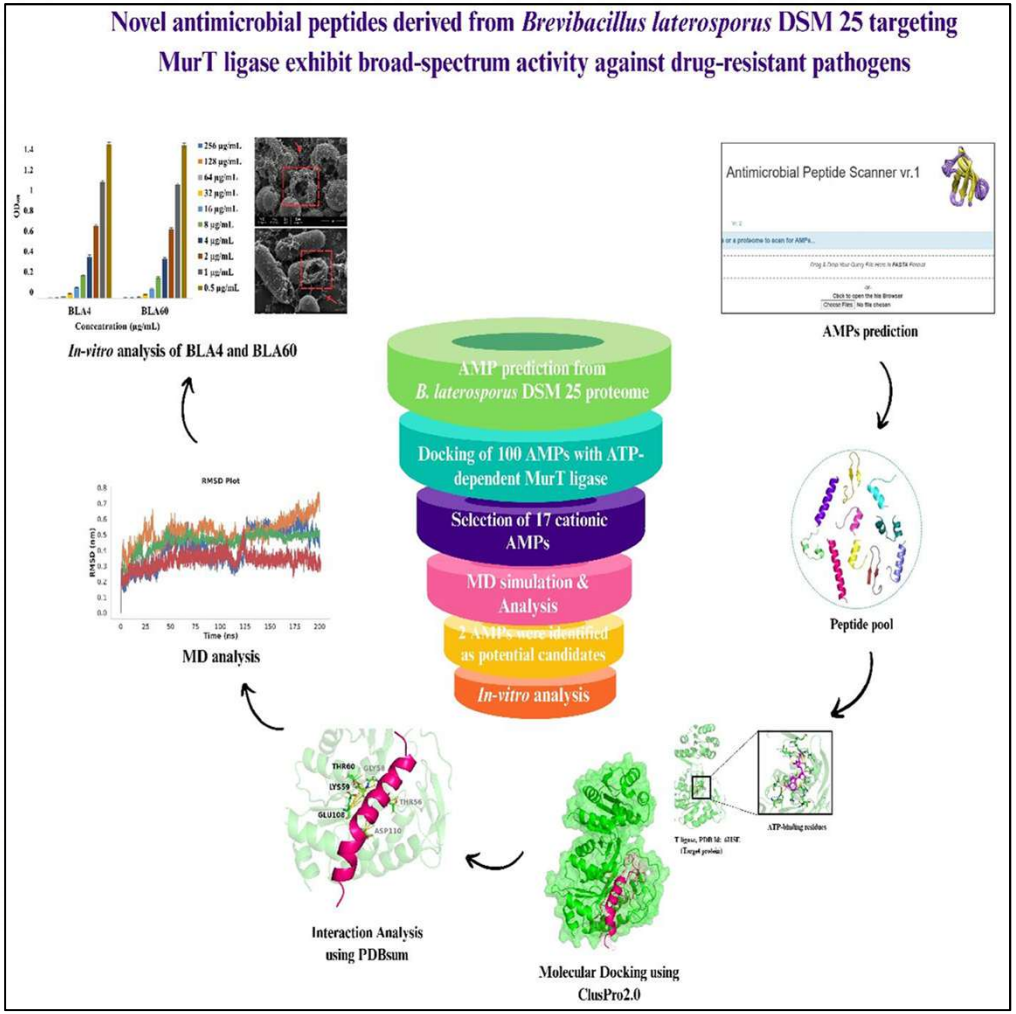
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Research Highlights





Dr. V. Kohila | Associate Professor | NIT Warangal

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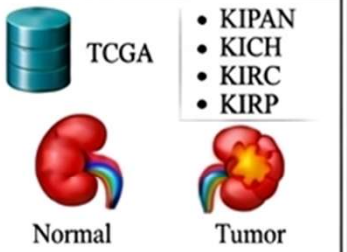
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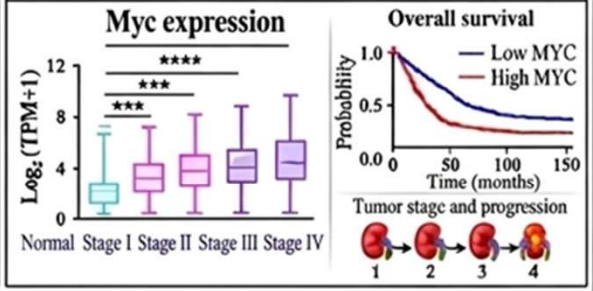
BT Biotechnology for a Better Tomorrow

Research Highlights

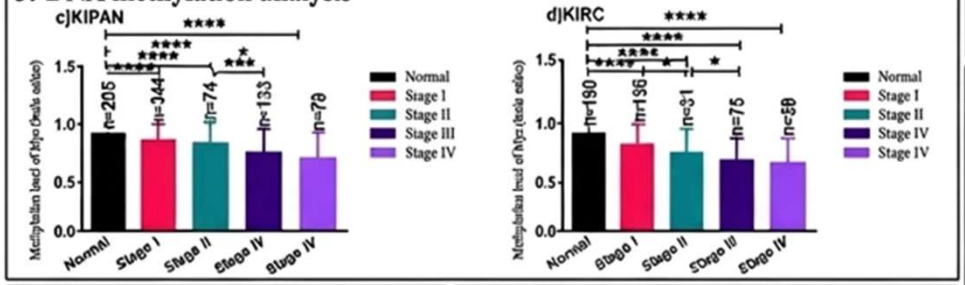
1. Data acquisition (TCGA)



2. Expression and clinical analysis of Myc

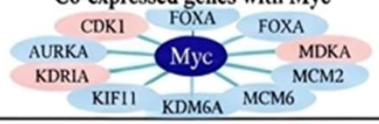


3. DNA methylation analysis



4. Co-expression analysis

Co-expressed genes with Myc

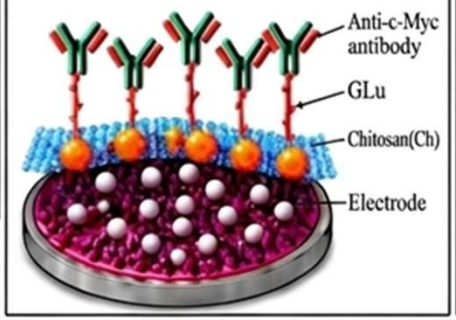


5. Functional enrichment and regulatory analysis

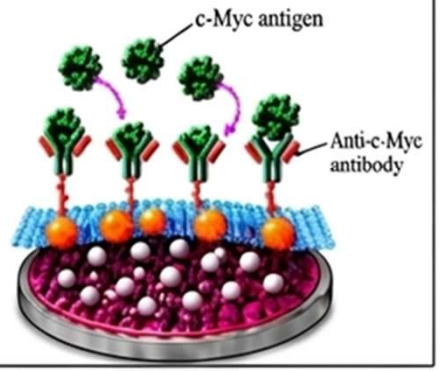
GSEA / Pathways

- Cell cycle & apoptosis
- Metabolic signaling
- Immune response
- Transcriptional regulation

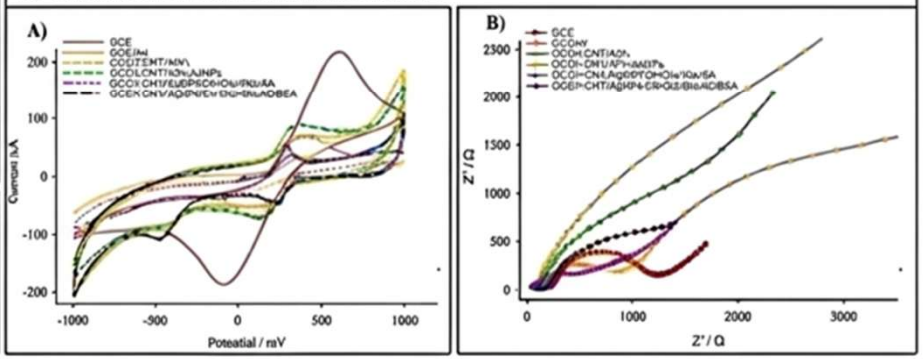
1. Bioelectrode



2. Bioelectrode detecting antigen



3. Electrochemical characterization



Prof. Urmila Saxena, Molecular Diagnostics and Biosensing Laboratory, NIT Warangal

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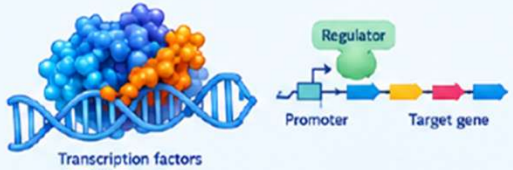
BT

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Research Highlights

1 Mycobacterial Gene Regulation

Deciphering transcriptional and post-transcriptional networks in *Mycobacterium tuberculosis*.

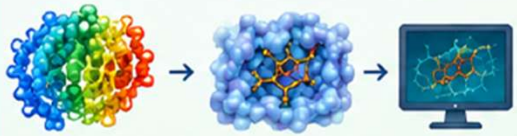


Transcription factors & DNA interaction

- Transcriptional & post-transcriptional regulation
- Regulatory proteins and sigma factors
- Functional analysis of mycobacterial proteins

2 Structural & Computational Biology

From sequence to structure — understanding protein function through structural and *in silico* approaches.

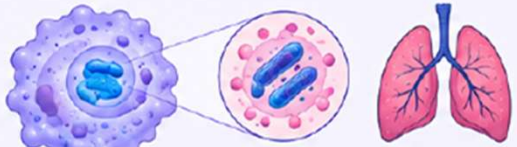


Protein modelling (AlphaFold / Homology) → Molecular docking & dynamics → MD simulations

Structure prediction | In silico screening | Structure-function insights

3 Host–Pathogen Interactions & Persistence

Exploring how *Mtb* survives, persists and causes infection in the host.

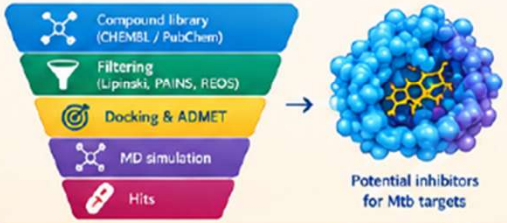


Macrophage | Mtb survival & persistence | Virulence & pathogenesis

Immune response | Host–pathogen interactions | Persistence mechanisms

4 Drug Discovery & Virtual Screening

Identifying novel inhibitors against key mycobacterial targets using computational and biochemical approaches.

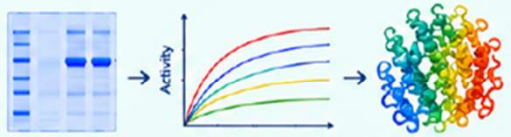


Potential inhibitors for Mtb targets

Virtual screening | Drug-like filtering | Molecular docking | ADMET analysis

5 Biochemical & Functional Characterization

Validating function through protein expression, purification and enzymatic studies.

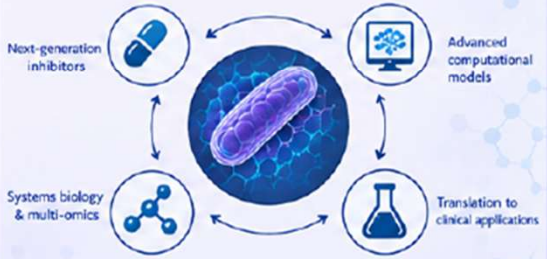


Protein expression & purification | Substrate concentration — Enzyme kinetics | Protein characterization & inhibitor screening

Biochemical assays | Enzyme kinetics | Binding studies | Functional validation

6 Future Directions

Towards targeted therapeutics and deeper insights into mycobacterial biology.



Dr. Amitava Bandhu | NIT Warangal

Mycobacterial Research Laboratory

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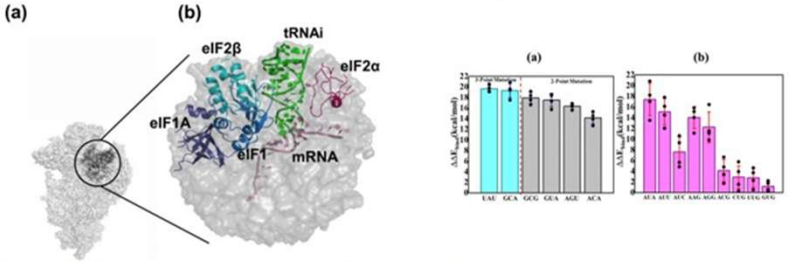
Research Highlights

Biomolecular Structure and Dynamics Laboratory

Dr. Thyageshwar Chandran, PhD (IISc Bangalore)

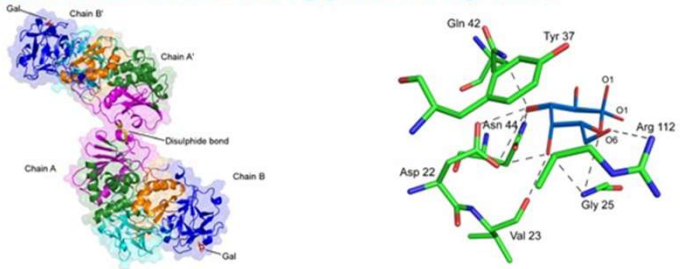
Associate Professor

Translation initiation and ribosome dynamics



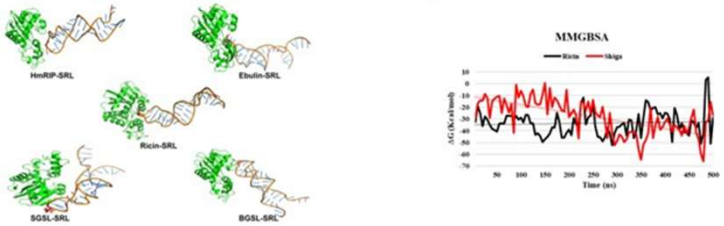
48S preinitiation complex and codon–anticodon binding energetics

Lectin architecture and glycan recognition



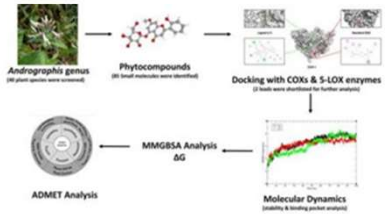
Bitter-gourd seed lectin structure and carbohydrate-binding site

Ribotoxin–RNA interactions and dynamics



Type II RIP–RNA docking and Shiga/ricin binding-energy profiles

Structure-based discovery of bioactive compounds



Andrographis phytocompounds: docking, MD and binding-energy analysis

Research support: ANRF and DBT • High-performance computing: PARAM Rudra

BMSD LAB

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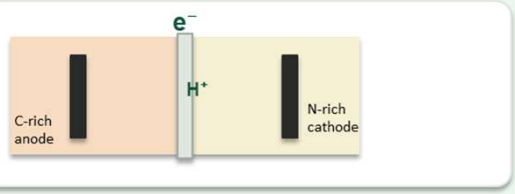
Research Highlights

FROM WASTEWATER TO ENERGY & RESOURCES

Selected recent research outputs | 2025–2026

01 HIGH-NITROGEN MFCs

Simultaneous nitrogen removal + bioelectricity



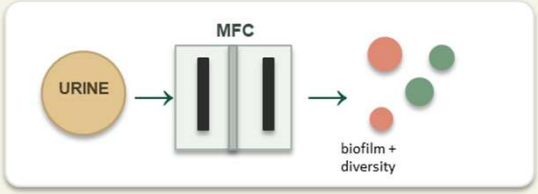
2 g/L NH_4Cl gave the best reported performance

80.56 mV	90.25%	92.18%
cell voltage	COD removal	TKN removal

Bhadra et al. (2025) | Environmental Science & Pollution Research

02 HUMAN URINE + MFCs

Hybrid substrate → biofilm & electron transfer



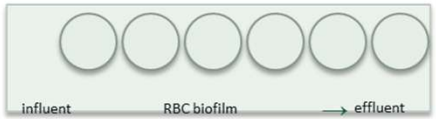
20–75% urine dilution studied with CV, EIS & 16S analysis

20–75%	CV + EIS	16S
urine fraction	electrochemistry	microbial profiling

Nayak et al. (2025) | Results in Chemistry

03 NEXT-GENERATION RBCs

Rotating biofilms + smart & bioelectrochemical integration



Energy-efficient wastewater treatment with resource-recovery potential

1–2 rpm	35–45%	MFC / MEC
typical rotation	disc submergence	hybrid pathways

Chauhan et al. (2026) | Environmental Engineering Science

RESEARCH IMPACT 153 publications • 55 journal papers • 55 book chapters • 8 books • 5 projects/consultancy 883 citations | h-index 30 | i10-index 49

Dr. Surajbhan Sevda | Environmental Bioprocess Laboratory | Department of Biotechnology | NIT Warangal

Google Scholar metrics updated September 2026 • Selected outputs shown above

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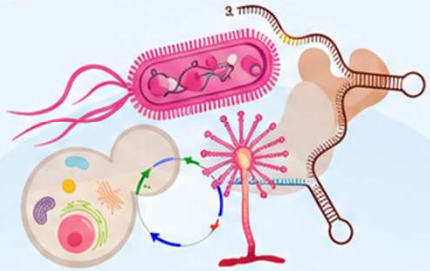
From Biomass to a Better Tomorrow

Sustainable Bioprocessing & Valorization



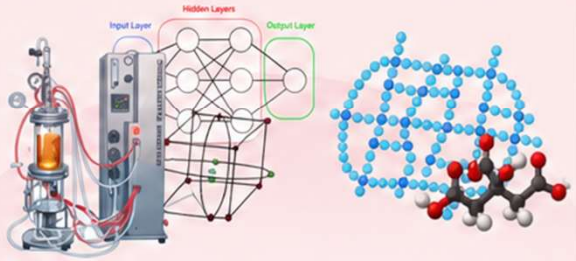
- Blue Economy
- Waste Valorization
- Biomass Valorization
- Enzyme Engineering
- Biopolymer Production

Microbial Engineering & Fermentation



- CRISPR-CAS Systems
- Precision Fermentation
- Batch Fermentation
- Fed Batch Fermentation
- Metabolic Engineering

Systems Analysis & Impact



- Metabolic Flux Analysis
- Flux Balance Analysis
- Mathematical Modelling
- AI – Integrated Process
- SDG 9, 12, and 13

BIOPROCESS DEVELOPMENT LABORATORY

Dr. Ashish Prabhu | Associate Professor | Bioprocess Development Laboratory | NIT Warangal
ashishp@nitw.ac.in

People • Processes • Positive Change

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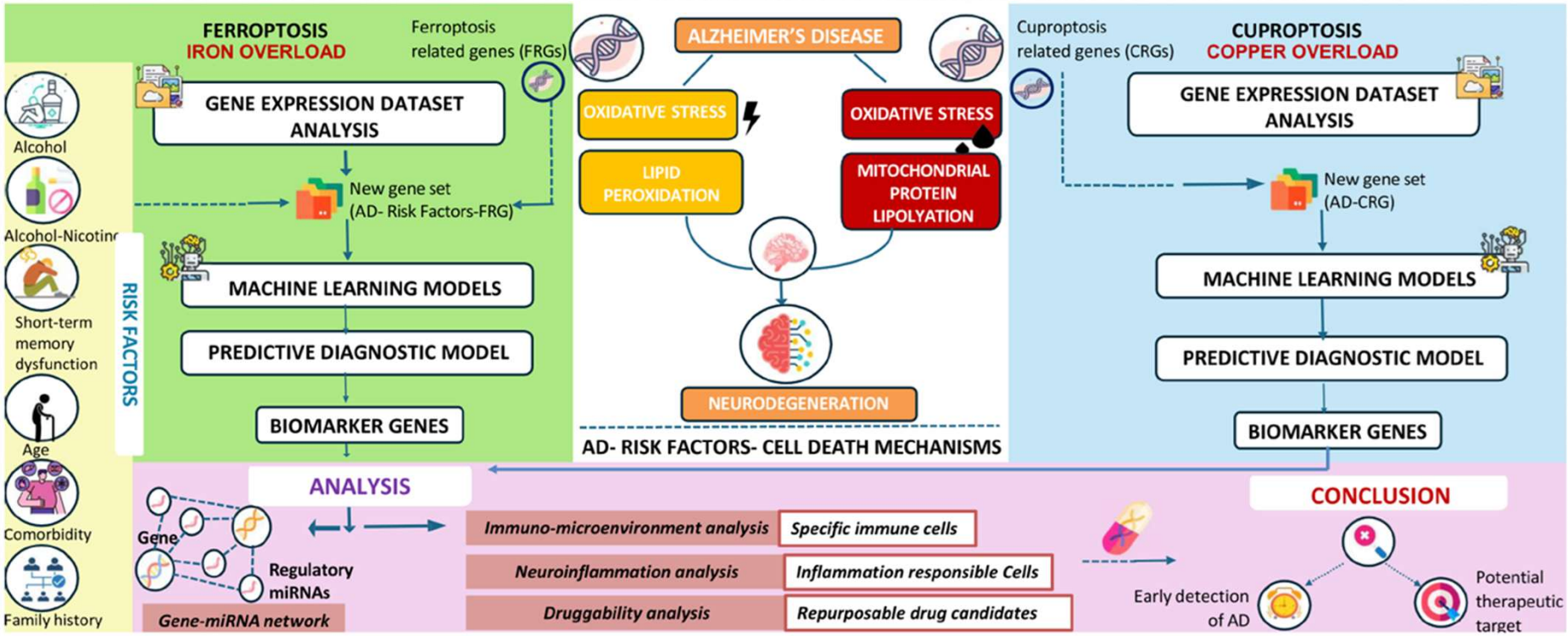
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Research Highlights

Iron and Copper Dysregulation in Alzheimer's Disease: Converging Roles of Ferroptosis and Cuproptosis



Investigators: P. Singh and S. L. Rath

@Theoretical and Computational Biophysics Lab, 2026

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Research Highlights

Research Highlights – Prof. Rathnaprabha D.

Plant Tissue Culture and Plant Biotechnology Lab, NIT Warangal

In vitro approaches for conservation, sustainable production of high-value phytochemicals and genetic improvement of medicinal plants

1 Selection of Plant Resources

Medicinal and threatened plant species



Nothapodytes foetida | *Butea monosperma*

Nothapodytes nimmoniana | *Momordica charantia*

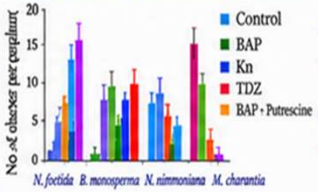
- ✓ Threatened & high-value species
- ✓ Collection and authentication
- ✓ Explant selection (nodal, leaf, seed, cotyledon etc.)

2 *In vitro* Regeneration and Mass Multiplication

Optimisation of culture conditions



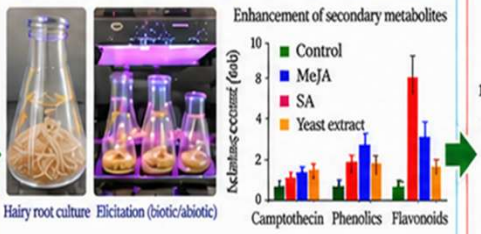
Effect of PGRs / Additives on Shoot Regeneration



- ✓ PGR and polyamine optimisation
- ✓ Activated charcoal for seed germination
- ✓ High-frequency regeneration
- ✓ Rooting and acclimatization

3 Advanced *In vitro* Systems

Elicitation, Hairy root culture and Secondary metabolite production

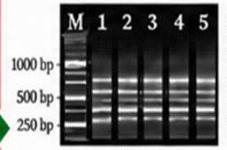


- ✓ Hairy root induction (*Agrobacterium rhizogenes*)
- ✓ Elicitation (methyl jasmonate, salicylic acid, yeast extract, UV)
- ✓ Enhanced production of bioactive compounds
- ✓ Scale-up in shake flask / bioreactor

4 Molecular and Phytochemical Characterization

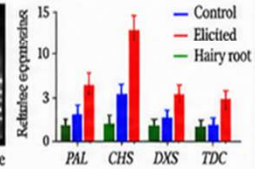
Genetic fidelity, gene expression and metabolite profiling

ISSR / SCoT analysis

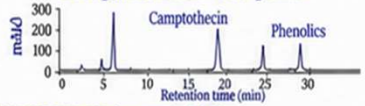


Monomorphic banding profile (confirms genetic fidelity)

Expression analysis of key genes



HPLC profile of bioactive compounds



- ✓ ISSR/SCoT/RAPD for genetic fidelity
- ✓ Expression analysis of biosynthetic genes
- ✓ HPLC/LC–MS for metabolite profiling
- ✓ Quantification of camptothecin, phenolics, flavonoids etc.

5 Application and Translation



- ✓ Conservation of rare/medicinal plants
- ✓ Sustainable production of high-value phytochemicals
- ✓ Potential for pharmaceutical and nutraceutical applications

6 Major Outcomes

28+	2	2	4
Research Publications	Sponsored Projects	Patents	Doctoral Students

High-frequency regeneration protocols	Genetic fidelity established	Enhanced production of bioactive compounds	Conservation and sustainable utilization

7 Broader Impact



From Plant Diversity to Human Well-being Through Biotechnology

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Research Highlights

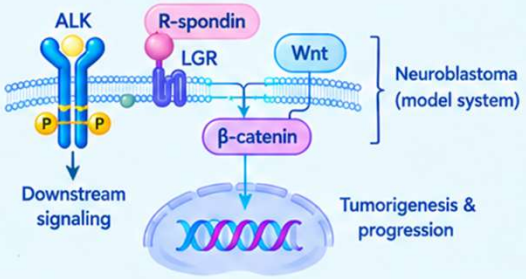
Cell Signaling Research Laboratory

Innovative Approaches for Cancer Biology, Nanotechnology and Drug Discovery

From Natural Resources to Novel Therapies

1 Cancer Signaling and Oncogenesis

ALK signaling and the ALK–R-spondin–Wnt axis in neuroblastoma

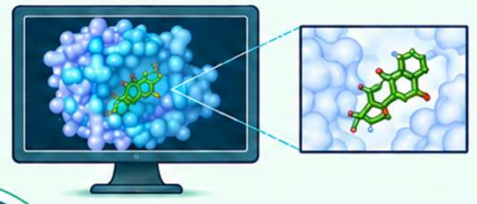


Key Publications

- *Int. J. Biol. Macromol.* (2025) Vol. 308, Part 1, 142413
  ALK-R-spondin-Wnt axis in neuroblastoma
- AACR. *Cancer Res.* (2026) Vol. 86 (13_Supplement), P58
  ALK-R-spondin-Wnt signaling axis in neuroblastoma

2 Computational Drug Discovery

Structure-based virtual screening for novel ALK inhibitors



Virtual screening → Hit selection → Novel inhibitors

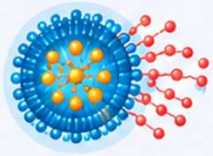
Key Publications

- J. Mol. Model. (2026) Vol. 32, 144
  Structure-based virtual screening for ALK inhibitors

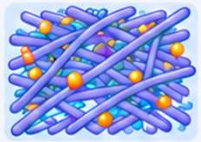
Cancer Biology
Nanotechnology
Drug Discovery

3 Smart Cancer Drug Delivery

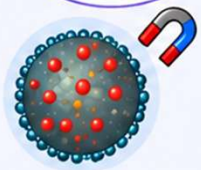
pH-responsive PLGA nanocarriers, nanofibers and magneto-responsive ferrogel microbeads



PLGA / Na-CMC / $CaCO_3$ niclosamide nanocarriers



Niclosamide-loaded nanofibers



Magneto-responsive ferrogel microbeads

Key Publications

- ACS Appl. Bio Mater. (2026) Vol. 8 (11), 10334-10343
  Dual-layered, pH-responsive PLGA nanocarriers for niclosamide delivery
- ChemSelect (2026) Vol. 11, e05847
  Green synthesized magneto-responsive ferrogel microbeads
- ACS Appl. Bio Mater. (2025) Vol. 8 (11), 10334-10343
  Engineered niclosamide loaded nanofiber platforms

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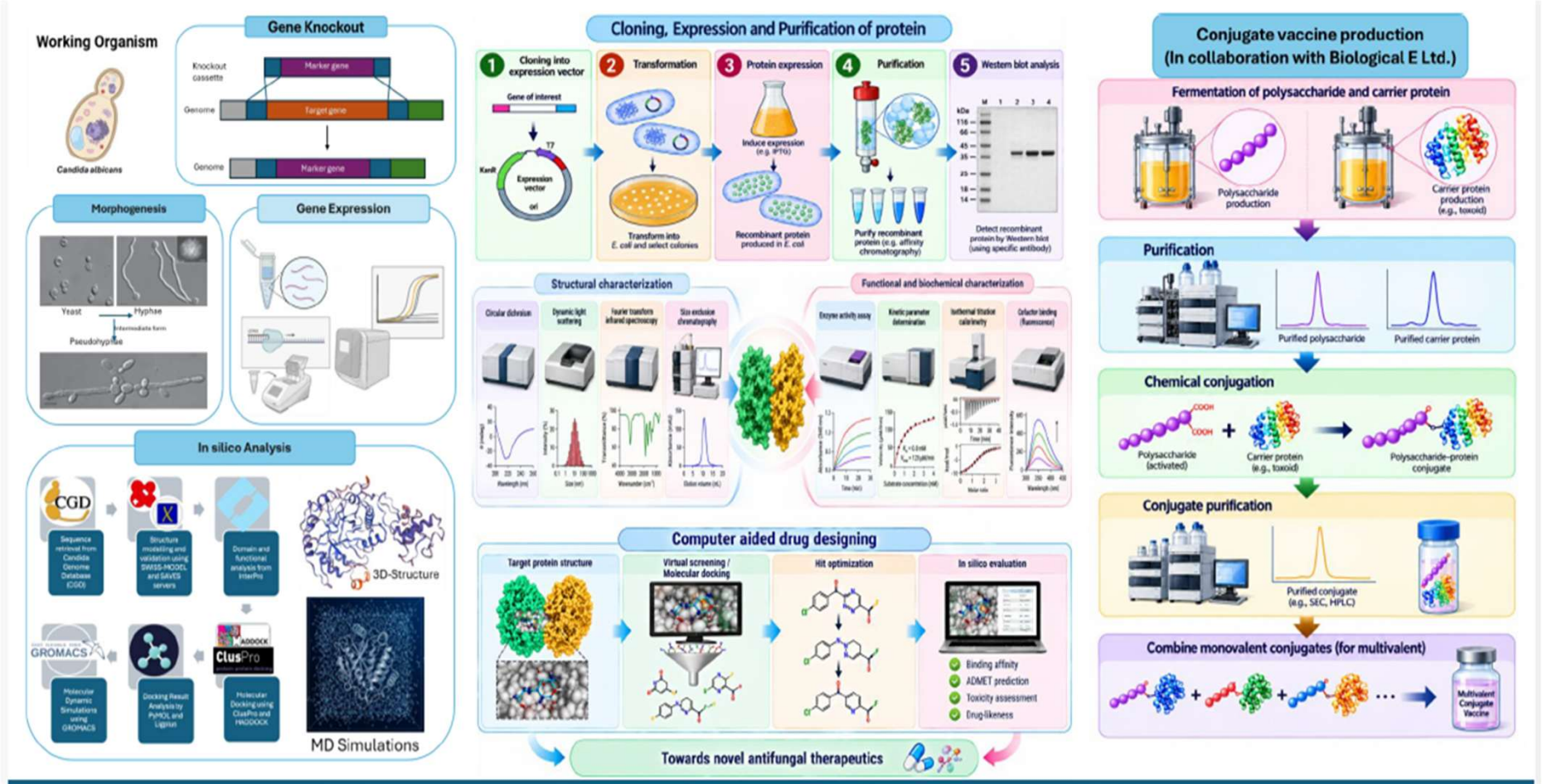
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Research Highlights



Dr. Priya, Assistant Professor, Department of Biotechnology, NIT-Warangal

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Departmental Activities

- Academic Conferences and FDPs
- Invited Lectures
- Industrial Tours
- BIOS (Biotechnology Society)

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Academic Conferences and FDPs

Conference On Emerging Trends in Structural Biophysics (CETSB 26)

09-11 Jan, 2026

Harnessing Structural Biophysics Frontiers:

Integrating Structure, Dynamics and Function — bringing together leading researchers and industry professionals.



"Molecular pharmaceutics for targeted cancer therapy: From design strategies to clinical trials"

25th to 29th May 2026

Organized by

CENTER FOR TEACHING AND LEARNING

(Established under the Scheme of MMTTP, UGC, Ministry of Education, Govt. of India)

and

Department of Chemistry and Department of Biotechnology

National Institute of Technology, Warangal

'Emerging Trends in Clinical Diagnostics, Immunoinformatics, and Natural Product-based Therapeutics'

6th – 10th July 2026

" Advances in Bioinformatics"

10th – 15th May, 2021

"Smart Solutions for Wastewater: Advances in Bioelectrochemical Treatment Technologies"

28th July – 1th August, 2025

ONLINE SKILL DEVELOPMENT COURSE

Next Generation Sequencing (NGS) and Data analysis through Hands-on

(Saturday, 27th December 2025 at 4:30 PM)

Online skill development programme

AI-Enabled Genomic Data Analysis, Gene Cloning & Protein Expression

27th March – 1st April, 2026

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20 Legacy of Excellences

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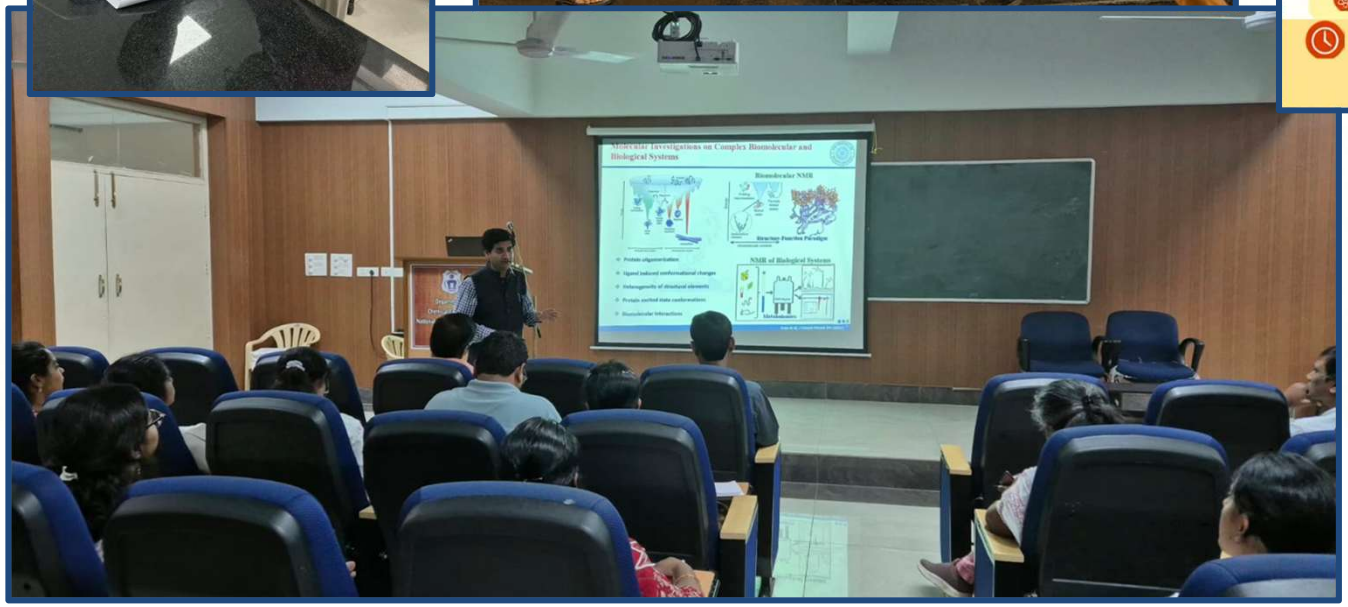
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Invited Lectures











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Industrial Tours











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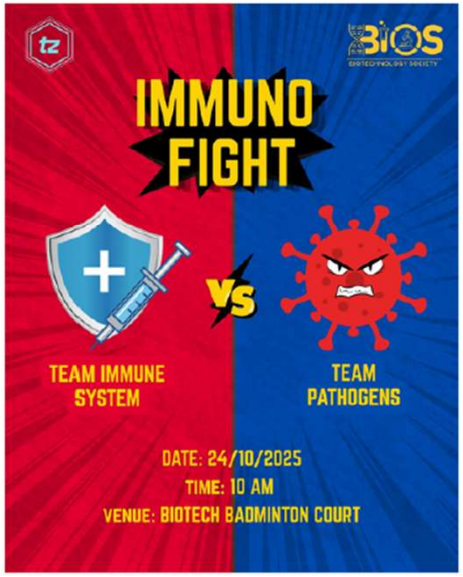
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