

BRIC –ILS INPUT FOR ANNUAL REPORT

Part A: Overview (not more than 300 words)

The Institute of Life Sciences (ILS), Bhubaneswar, is a premier autonomous research institute dedicated to high-quality multidisciplinary research in life sciences, with the objective of advancing human health, agricultural sustainability, and environmental well-being. The Institute strives for excellence in scientific innovation and entrepreneurship, focusing on the BRIC-recognized thematic areas of precision therapeutics, climate-resilient agriculture, functional food, and marine research. ILS has made significant contributions in areas such as malaria parasite biology and anti-malarial drug development, *Candida* pathogenesis and vaccine research, Chikungunya and Hepatitis viral biology and disease mitigation, the identification of immune-stimulating therapeutic compounds for sepsis, biomaterial development for tissue regeneration and phytonanomedicine-based anticancer therapy. ILS has initiated major programs in bioprospecting of plants, microbes, and marine resources, supported by the DBT-sponsored Himalayan Bio-mission, Marine Biotechnology projects, and the Ministry of Ayush, leading to the discovery of natural products with anti-malarial, anti-cancer, and anti-viral potential. The ongoing marine and deep-ocean program, supported by the Ministry of Earth Sciences (MoES), further aims to identify novel bioactive agents using advanced biotechnological tools for applications in medicine, pharmaceuticals, nutraceuticals, and cosmetics. To promote biotechnology-driven innovation, ILS has established a biotechnology incubator that supports entrepreneurship in bioinformatics, biopharmaceuticals, industrial biotechnology, MedTech, food and wellness, indigenous biotech products, and agriculture. Encouraging faculty-led innovation, ILS has successfully facilitated research-based spin-off enterprise. Additionally, through its Biotech-KISAN Hub in two aspirational districts of Odisha, ILS promotes biofortified crop cultivation, crop diversification, and scientific livestock rearing, contributing to rural bioeconomic development. Beyond research, ILS remains committed to public outreach and scientific awareness, fostering a culture of scientific curiosity and innovation across society.

Part B:

1. Name of the Institute: BRIC-Institute of Life Sciences

2. Mandate:

The Institute of Life Sciences (ILS), Bhubaneswar, operates with the mandate to advance high-quality, multidisciplinary research across diverse domains of the life sciences, with the objective of improving human health and welfare. The Institute's research activities are strategically organized around four broad thematic areas, namely, Infectious Disease Biology, Cancer Biology, Plant and Microbial Biotechnology, and cross-cutting interdisciplinary fields. Research in Infectious Disease Biology focuses on elucidating the molecular and immunological mechanisms underlying host-pathogen interactions to facilitate the development of novel diagnostics, vaccines, and therapeutic interventions. In the domain of Cancer Biology, efforts are directed toward understanding cancer genetics, molecular signaling, and tumor microenvironmental dynamics to identify new biomarkers and therapeutic targets for effective cancer management. Research in Plant and Microbial Biotechnology aim to exploit biological resources and biotechnological tools to develop climate-resilient crops and sustainable solutions for agriculture and the environment. The cross-cutting research programs encompass integrative approaches spanning genomics, structural biology, bioinformatics, chemical biology, and biomaterial science, thereby fostering innovation and technological advancement across disciplines. Through these concerted initiatives, ILS seeks to promote scientific excellence, innovation, and capacity building, thereby contributing to national goals in health, agriculture, and environmental sustainability.

3. Research focus:

The Institute of Life Sciences (ILS), Bhubaneswar, is committed to advancing excellence in scientific research, innovation, and entrepreneurship. Guided by BRIC recognized thematic areas namely, precision therapeutics, climate-resilient agriculture, functional foods, and marine research the institute undertakes cutting-edge research addressing current and future challenges in human health and welfare. Relying on its strong expertise, collaborative environment, and diverse research activities, ILS focuses on the following major initiatives:

1. Bioprospecting on Marine sources for Novel Therapeutics: Exploring Odisha's unique forest and marine biodiversity to discover new bioactive agents for the treatment of cancer, antimicrobial resistance (AMR), arboviral infections, and immunopathologies.

2. Vaccine and Antiviral Development: Designing multipotent vaccines and broad-spectrum therapeutic agents to counter emerging and re-emerging infectious diseases.
3. Cancer Biology and Therapeutics: Identifying novel molecular targets and strategies to overcome cancer.
4. Immunological Interventions: Harnessing the host immune system to combat autoimmune diseases, host-pathogen interactions, and viral infections.
5. Genomic and Personalized Medicine: Developing genome sequence based tools to support personalized therapeutic applications.
6. Drug Delivery and Biomaterials: Engineering innovative vehicles for drug delivery, gene therapy, and biomaterials to improve pharmacokinetics, bioavailability, and therapeutic efficacy.
7. Agricultural Biotechnology: Developing biotic and abiotic stress-resistant crop varieties using plant genomics and biotechnological approaches to mitigate viral infections in plants.

4. Infographic of the thematic areas being dealt in the institute:



Key research highlights for the year 2025

1. NEK9-mediated Wnt signalling repressor TLE3 rewires Docetaxel resistance in cancer cells by inducing pyroptosis

Docetaxel alone or in combination with other drugs is the most common chemotherapy regimen for several neoplasms including advanced OSCC. Unfortunately, chemoresistance leads to relapse and continued tumor growth. It is therefore important to explore the causative factors for Docetaxel resistance. In this study, we performed a CRISPR-based kinome screening that identified Never In Mitosis Gene-A Related Kinase-9 (NEK9) as a major player of Docetaxel resistance in OSCC, prostate, and pancreatic cancer lines. NEK9 expression was found to be upregulated in tumor samples of chemotherapy non-responders as compared to responder OSCC patients. Our validation data suggests that selectively knocking out NEK9

sensitizes cancer cells to Docetaxel. RNA sequencing data indicates that ablation of NEK9 upregulates Transducin-like enhancer protein 3 (TLE3) which in turn represses (TCF)-mediated canonical Wnt signalling (Figure). The in-vitro kinase activity assay identified Fostamatinib as a potent inhibitor of NEK9. The xenograft data suggest that Fostamatinib restores Docetaxel sensitivity and facilitates a significant reduction of tumor burden. Overall, our data suggests the novel combination of Fostamatinib and Docetaxel needs further clinical investigation in advanced OSCC.

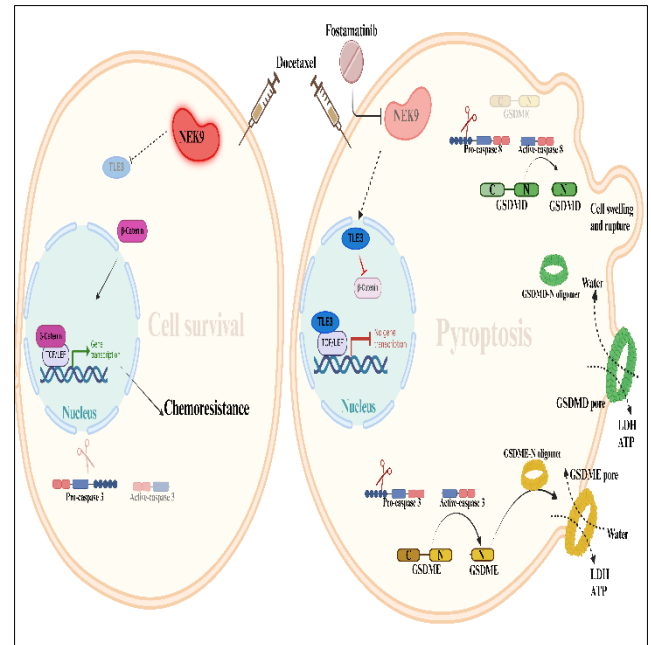


Figure: Mechanism by which NEK9 regulates Docetaxel resistance in oral squamous cell carcinomas (Ansari et al., British Journal of Cancer September 2025)

2. CNA25: A potential Antifungal vaccine

Disseminated fungal infections account for ~1.5 million deaths per year worldwide and the fatality rate may further increase due to a rise in the number of immunocompromised individuals and drug-resistance fungal species. Since an approved antifungal vaccine is yet to be available for human use, we explored the immunogenicity and vaccine efficacy of a genetically engineered attenuated strain of *Candida albicans*, CNA25. CNA25 is a *pol32* null strain that exhibits growth defects at non-permissive conditions, reduced filamentation, and higher β -glucan content and does not cause systemic candidiasis in mice. Intravenous immunization with live CNA25 protected mice against pan-fungal infections. CNA25 induced higher and steady expression of Dectin1 and TLR2 receptors leading to faster recognition and clearance by the immune system and activation of protective immune response mostly mediated by neutrophils, NK cells, and

IL17, IFN γ , and TNF α producing CD4⁺ T cells. While higher fungal load and increased inflammatory cytokines caused the death of WT *C. albicans* infected mice, a reduced fungal load and a balanced pro- and anti-inflammatory cytokine profile led to survival and further protection to *C. albicans* in CNA25-vaccinated mice. Moreover, CNA25 was avirulent even in SCID and neutropenia mice models and protected to different doses of WT re-challenge. Altogether this study proposed further exploration of CNA25 as a promising live whole-cell vaccine against systemic candidiasis.

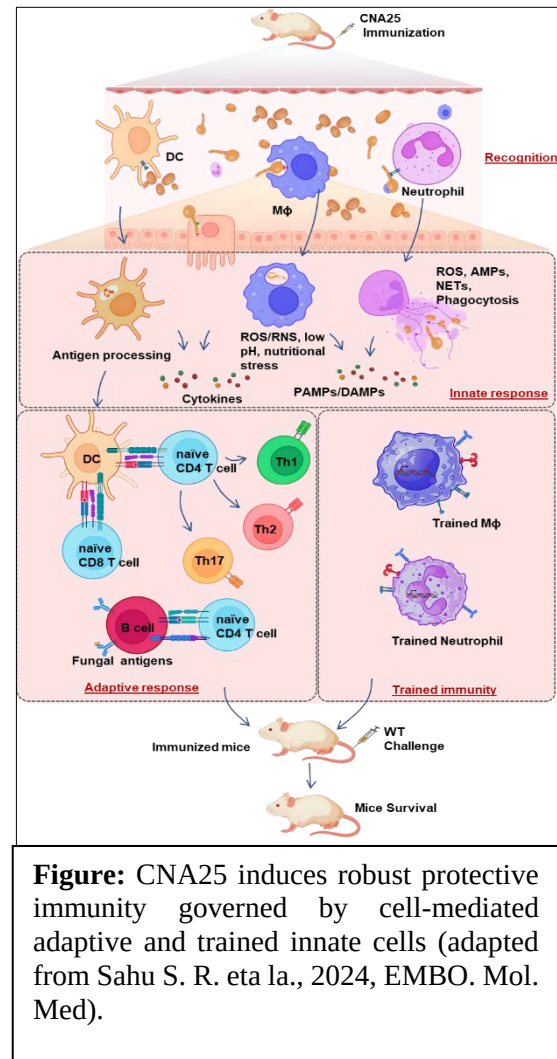


Figure: CNA25 induces robust protective immunity governed by cell-mediated adaptive and trained innate cells (adapted from Sahu S. R. et al., 2024, EMBO. Mol. Med).

3. Rewiring Resistance: Efflux pump inhibitor Montelukast Restores Antibiotic Sensitivity in Multidrug Resistant *S. aureus*.

The group led by Dr Tushar Beuria published the study “Efflux pump modulation by Montelukast and its roles in restoring antibiotic susceptibility in multidrug-resistant

Staphylococcus aureus” in eBioMedicine (The Lancet Group, Volume 114, 2025; Article 105658). This work addressed the urgent global challenge of antimicrobial resistance by exploring drug repurposing as a strategy to counteract multidrug-resistant *Staphylococcus aureus*, a pathogen prioritized by the World Health Organization for new therapeutic interventions. From a screening of 774 FDA-approved drugs, Montelukast, widely used for asthma, was identified as a potent inhibitor of bacterial efflux systems, particularly the NorB pump responsible for fluoroquinolone (moxifloxacin) resistance. When combined with moxifloxacin, Montelukast significantly enhanced antibacterial activity both in laboratory studies and in a murine skin infection model, resulting in a remarkable 4.5-log reduction in bacterial burden compared to monotherapy. Mechanistically, Montelukast acts through precise modulation of the global transcriptional regulator MgrA, a key controller of efflux pump gene expression in *S. aureus*. Montelukast binds strongly to MgrA ($K_d \approx 28$ nM), inducing conformational changes that promote its phosphorylation. This phosphorylated form of MgrA exhibits increased affinity for the *norB* promoter, leading to repression of *norB* transcription and a subsequent reduction in efflux activity. Concurrently, Montelukast enhances the *pknB/rsbU* gene expression ratio, favoring the kinase-mediated phosphorylation state of MgrA and reinforcing suppression of *norB*. These molecular events collectively increase intracellular antibiotic retention and restore bacterial susceptibility to moxifloxacin. Importantly, Montelukast exhibited no intrinsic antibacterial effect, cytotoxicity, or interference with membrane integrity, confirming its safety for combination therapy. This study represents a significant advancement in the field of antimicrobial resistance research. By demonstrating that a well-established and clinically safe drug can restore the potency of existing antibiotics, our findings open new avenues for therapeutic repurposing. This work underscores the

transformative potential of drug repurposing as a sustainable and innovative solution to one of modern medicine's most pressing challenges.

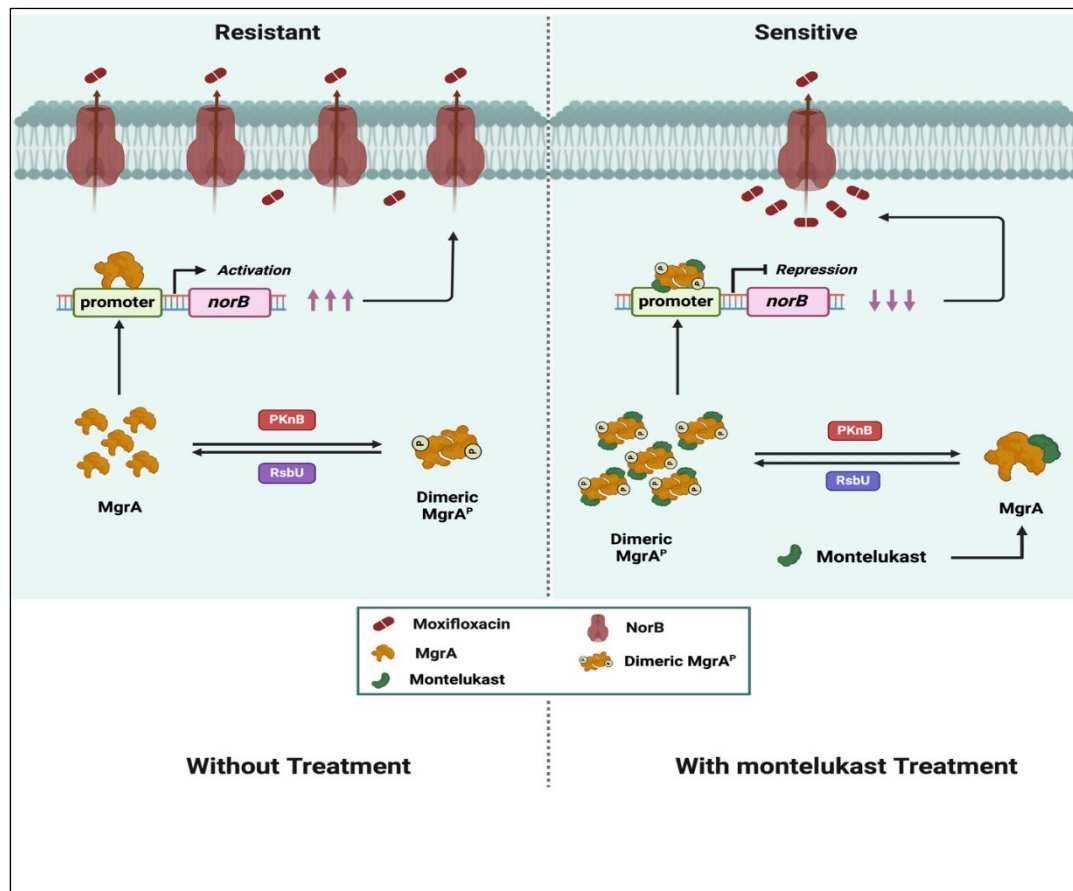


Figure: Mechanism of NorB Inhibition by Montelukast: The MgrA protein in *S. aureus* primarily exists as a monomer. In the monomeric state, it functions as a direct repressor of the *norA* gene while simultaneously functioning as a direct activator of the *abcA* and *norB* genes. Upregulation of *norB* causes increased expression of the NorB efflux pump, allowing most moxifloxacin to be effluxed out of the cell, resulting in moxifloxacin resistance in multidrug-resistant *S. aureus*. In contrast, when Montelukast is treated, it interacts with MgrA, resulting in structural modifications promoting increased dimerisation and MgrA phosphorylation. Phosphorylated MgrA activates *abcA* and *norA* but represses *norB*. Higher phosphorylation of MgrA in the presence of Montelukast causes higher repression of *norB*, resulting in lesser production of the NorB efflux pump. A decrease in NorB production reduces moxifloxacin efflux from the cell while increasing

4. PTBP2: a new player in CML disease progression

Polypyrimidine tract binding protein 2 (PTBP2) regulates alternative splicing in neuronal, muscle, and Sertoli cells. PTBP2 and its paralog, PTBP1, which plays a role in B-cell development, were found to be expressed aberrantly in myeloid leukemia. Genetic ablation of *Ptbp2* in the cells resulted in decreased cellular proliferation and repopulating ability, decreased reactive oxygen species (ROS), and altered mitochondrial morphology. RNA immunoprecipitation followed by sequencing (RIP-seq) and functional assays confirmed that PTBP2 binds to Bcl-2 Interacting Protein 3 (Bnip3)-3'UTR and stabilizes its expression. Our study also suggests that PTBP2 promotes autophagy, as evidenced by the low levels of LC3-II expression in *Ptbp2*-knockout cells treated with Bafilomycin A1. This effect was restored upon overexpression of Bnip3 in the knockout cells. Notably, when KCL22-NTC cells were subcutaneously injected into the flanks of mice, they gave rise to malignant tumors, unlike *Ptbp2*-KO-KCL22 cells. Also, transplantation of KCL22 cells through the tail vein in NOD/SCID mice resulted in higher cell engraftment and increased infiltration of malignant cells in the extramedullary organs. Our study underscores the role of PTBP2 in promoting cell proliferation and tumor formation while enhancing autophagy through Bnip3, thereby supporting the role of PTBP2 as an oncogene in CML.

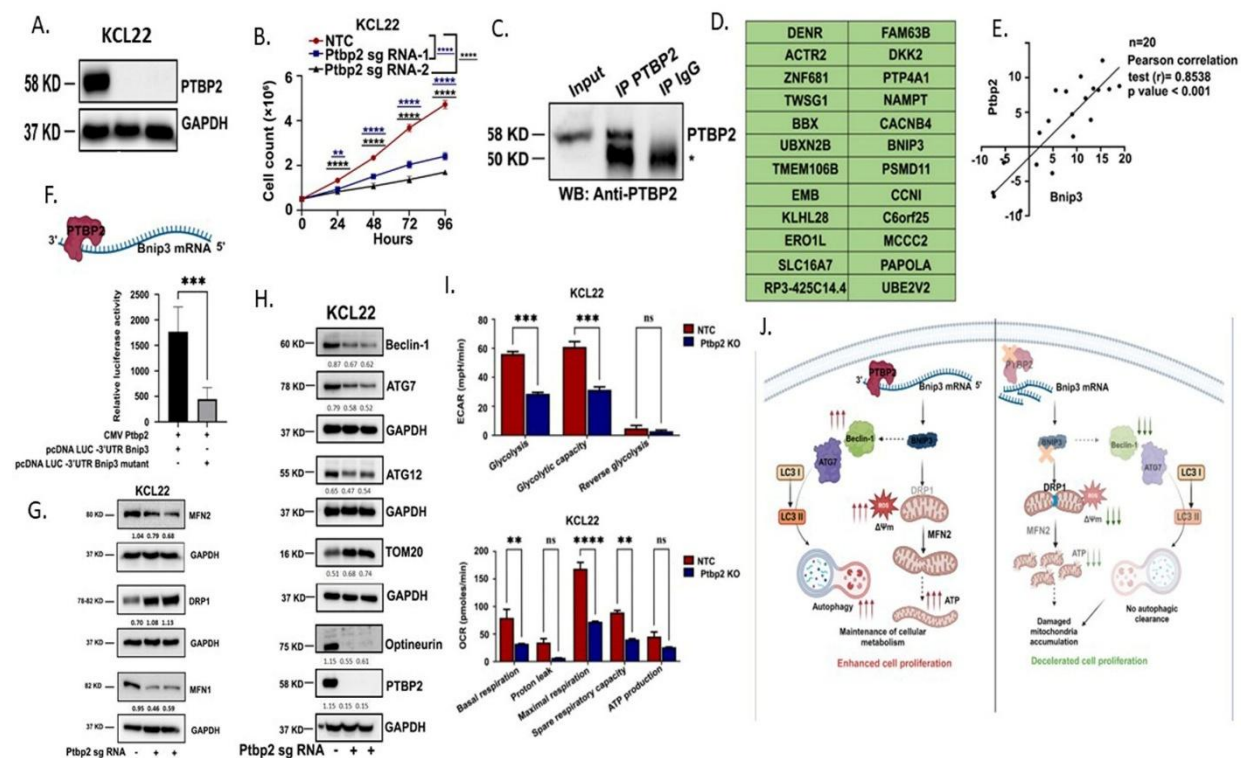


Figure: A. Western blot analysis of KCL22-NTC and Ptbp2-KO-KCL22 cell lysates probed with the indicated antibody. The GAPDH antibody was used as an internal loading control. **B.** The proliferation rates of KCL22-NTC, and Ptbp2-KO-KCL22 cells were evaluated using the trypan blue exclusion test for cell viability. Proliferation rates at 24, 48, 72, and 96 h are represented in the line graph. Each point represents the mean and standard deviation of independent triplicates ($n = 3$), $**p < 0.01$ and $****p < 0.0001$. **C.** Immunoprecipitation of PTBP2 was performed using a PTBP2 antibody; 10% of the whole-cell lysate was used as input lysate (lane 1), lysate immunoprecipitated with PTBP2 antibody (lane 2), lysate immunoprecipitated with IgG as a negative control (lane 3). The blot was probed with a PTBP2 antibody. “*” represents the IgG. **D.** The common PTBP2-bound targets are represented in the table. **E.** Ptbp2 and Bnip3 mRNA correlation in CML patient samples ($n = 20$) $p < 0.001$. **F.** Diagrammatic image of PTBP2 binding to 3'UTR of BNIP3 (Top panel) (Created in Biorender). 3'UTR binding site in Bnip3 and the mutated site was cloned in the luciferase vector, and luciferase assay was performed by transfecting the clone along with wild-type PTBP2 in HEK293T cells. Renilla luciferase was used as an internal control. After 24 h, luciferase activity was measured. Data presented are the fold change relative to empty vector-transfected cells. The data was analyzed and represented by a bar diagram. $***p < 0.001$ (Bottom panel). **G.** Western blot analysis of MFN2, DRP1, and MFN1 in control KCL22-NTC vs Ptbp2-KO-KCL22 cells. An equal amount of protein (30 μ g) was used for both cell lines, and GAPDH was used as an internal loading control. **H.** Western blot analysis of Beclin-1, ATG7, ATG12, Optineurin, TOM20, and PTBP2 in KCL22-NTC vs. Ptbp2-KO-KCL22 cells. An equal amount of protein (30 μ g) was loaded and GAPDH was used as an internal loading control. **I.** The glycolytic ability was measured in KCL22-NTC vs. Ptbp2-KO-KCL22 cells. The experiments were carried out using the Seahorse XFp Glycolysis Stress test, and bar graph depict the ECAR measurement (Bottom panel). The results represent the mean and standard deviation of the experiment. Two-way ANOVA was implemented for statistical analysis, followed by a multiple comparison test $***p < 0.001$ and ns not significant. The Seahorse XFp Cell Mito Stress test was utilized, and the OCR measurement was examined in KCL22-NTC vs. Ptbp2-KO-KCL22 cells. The outcome represents the mean and standard deviation of the experiment. Two-way ANOVA was used for statistical analysis, and the comparison test (Top panel) $**p < 0.01$, $****p < 0.0001$, and ns not significant. **J.** Diagrammatic summary of the study (created in Biorender).

5. Telmisartan, an anti- hypertensive drug impedes JEV infection possibly via AT1/PPAR γ axis

In Asia, Japanese encephalitis virus (JEV) is one of the most common pathogens responsible for viral encephalitis. While the fatality rate is approximately 20-30%, in 30-50% of cases it causes irreversible damage to neurons of the infected individual. Till date, no specific antiviral is available for therapeutic management of JE. Activation of Angiotensin Type1 receptor (AT1R) with formation of reactive oxygen species and inflammatory cytokines are involved in the pathogenicity of viral encephalitis. Also reduced PPAR γ receptor activation is reported to contribute to chronic inflammation in brain. Thus, blocking AT1R axis and activating PPAR γ can be a possible therapeutic approach to manage viral encephalitis. Hence, Telmisartan (TM), an approved AT1 blocker and partial agonist of PPAR γ with better brain permeability was investigated as antiviral for JEV. TM remarkably reduced JEV titer, RNA and protein (NS3) with an IC₅₀ of 24.68 μ M and a CC₅₀ of >350 μ M (Selectivity Index >14.18) in the BHK-21 cells. The anti-JEV property of TM was also demonstrated in physiologically relevant cell lines including SH-SY5Y, HEK293 and Huh7 cells. The viral load was significantly reduced in pre,

during and post-TM treatment conditions. In the presence of PPAR γ antagonist (GW) and AT1 agonist (AG), viral infection was enhanced significantly with upregulation of AT1R and downregulation of PPAR γ receptor. However, TM treatment restored these levels while reducing viral infection. The siRNA knockdowns of AT1 and PPAR γ receptor resulted in non-significant change in infection upon TM administration. Furthermore, in RAW264.7 cells significant decrease in levels of inflammatory markers like p-IRF-3, COX-2 and p-NF- κ B post TM treatment supported its mechanism of action through the AT1/PPAR γ axis. Finally, the anti-JEV potency of TM (10mg/kg) was validated in mouse model. The reduction in disease score, viral RNA, protein and histological changes defines the anti-JEV property of TM *in vivo*. Collectively, the above findings suggest the preclinical efficacy of TM emphasizing its suitability for repurposing against JEV.

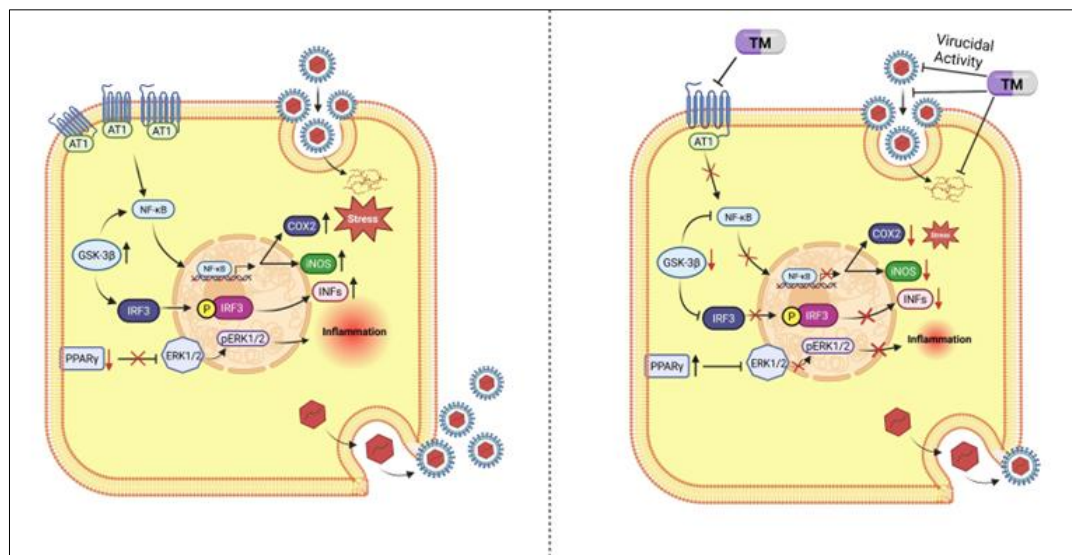


Figure: Image representing TM working model in JEV infected RAW264.7 cells. (Left Panel) The schematic figure depicting alterations in the expressions of AT1, PPAR γ and other downstream key players such as p-ERK1/2, p-NF- κ B, p-IRF3, GSK-3 β , and COX-2 after JEV infection. (Right panel) The schematic figure showing restoration of altered protein expression levels after TM treatment. Moreover, TM hampers the JEV life cycle, and also possesses virucidal activity, resulting in reduced viral load. This reduces oxidative stress, inflammation and prevents cell from injury and death. (Datey A, Chatterjee S, Ghosh S, Kumar P S, De S, Ghoraia U, Hotag D, Subudhih B B, and **Chattopadhyay S***. Telmisartan, an anti- hypertensive drug impedes JEV infection possibly via AT1/PPAR γ axis.)

6. List of publications 2025: (November 2024-October 2025)

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7. List of patents Filed 2025: (November 2024 to October 2025)

Sl. No.	Title	Application Number	Date of Application	Name of Inventors
1.	A Protein Subunit Vaccine Composition against Mycobacterium tuberculosis	202531019685	March 05, 2025	Dr. Sunil Kumar Raghav, ILS; Prof. Ashis Biswas, IIT, BBSR; Mr. Subhasish Prusty, ILS; Ms. Subhashree Barik, IIT, BBSR; Dr. Alok Kumar Panda, IIT, BBSR
2.	Cinnamic acid-derived N-heterocyclic compounds (TPDM and TF) inhibit SARS-CoV-2 infection and its method of preparation	202531031984	March 31, 2025	Dr. Soma Chattopadhyay, ILS; Dr. Bharat Bhusan Subudhi, SOA; Tompe Krishna Vitthalrao, SOA; Dr. Koustav Chatterjee, ILS; Dr. Ipsita Mohanty, ILS; Mr. Soumyajit Ghosh, ILS
3.	Salicylic acid derived carbon dots (SA-CDS) inhibiting SARS-CoV-2 infection and its method of preparation	202531031962	March 31, 2025	Dr. Soma Chattopadhyay, ILS; Dr. Bharat Bhusan Subudhi, SOA; Tompe Krishna Vitthalrao, SOA; Dr. Koustav Chatterjee, ILS; Dr. Ipsita Mohanty, ILS; Mr. Soumyajit Ghosh, ILS
4.	Triptolide and composition thereof for inducing insulin production	202531047374	May 16, 2025	Dr. Amaresh Chandra Panda, ILS; Mr. Susovan Sadhukhan, ILS
5.	A biomimetic polymeric nanoformulation for management of osteosarcoma	202531048304	May 20, 2025	Dr. Mamoni Dash, ILS; Mr. Pratigyan Dash, ILS
6.	Infectious clones of chikungunya virus	202531053475	June 02, 2025	Dr. Soma Chattopadhyay, ILS; Ms. Eshna Laha, ILS; Mr. Sharad Singh, ILS
7.	Pharmaceutical compositions comprising sertaconazole or oxiconazole as efflux pump inhibitors for	202531053455	June 02, 2025	Dr. Tushar Kant Beuria, ILS; Mr. Suvendu Ojha, SRF, ILS

	treating multidrug-resistant <i>Staphylococcus aureus</i> infections			
8.	A kit-based method for evaluating and monitoring the efficacy of tuberculosis treatment to develop personalized therapy	202531072431	July 30, 2025	Dr. Sunil Kumar Raghav, ILS; Mr. Subhasish Prusty, ILS; Ms. R. Divya , ILS

8. List of patents granted 2025:

Sl. No.	Title	Grant Number	Date of Grant	Name of Inventors
1.	Griseofulvin as an adjunct drug for the treatment of cerebral and severe malaria	UK - GB2616213	Garanted in UK on January 08, 2025	Dr. Viswanathan Arun Nagaraj; Mr. Govindarajan Padmanaban; Ms. Manjunatha Chandana Shetty; Mr. Aditya Anand; Mr. Sourav Ghosh
2.	A process for nitric oxide generation in vitro and endogenous induction in vivo	IND: 558638 EP4240351	IND: January 23, 2025; Europe: August 27, 2025	Dr. B.Ravindran,; Mr. Diwakar Kumar Singh; Mr. Shailendra Asthana; Mr. Sagar Gaikwad; Dr. Dileep Vasudevan; Dr. Narottam Acharya

9. List of Major Technologies developed in 2025:

The following technologies have been developed during the period:

A. Protein Subunit Vaccine Composition against *Mycobacterium tuberculosis*.

Name of the patent	:	Protein Subunit Vaccine Composition against <i>Mycobacterium tuberculosis</i>
Inventor	:	Sunil Kumar Raghav, Ashis Biswas, Subhasish Prusty, Subhashree Barik and Alok Kumar Panda
Patent Application Number	:	202531019685

Summary of the technology:

Tuberculosis (TB) is one of the world's deadliest infectious diseases and the currently available BCG vaccine, developed a century ago, offers limited protection primarily to infants and does not sufficiently protect adolescents and adults from pulmonary TB. This next-generation vaccine is composed of novel recombinant subunit protein, designed to more effectively target *Mycobacterium tuberculosis*. This vaccine addresses the limitations of BCG by triggering a more robust, targeted, and long-lasting immune response.

B. Cinnamic acid-derived N-heterocyclic compounds (TPDM and TF) inhibit SARS-CoV-2 infection and its method of preparation.

Name of the patent	:	Cinnamic acid-derived N-heterocyclic compounds (TPDM and TF) inhibit SARS- CoV-2 infection and its method of preparation
Inventor	:	Soma Chattopadhyay, Bharat Bhusan Subudhi, Tompe Krishna Vitthalrao, Koustav Chatterjee, Ipsita Mohanty and Soumyajit Ghosh
Patent Application	:	202531031984

Number	
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Summary of the technology:

This invention reports the development of cinnamic acid-derived N-heterocyclic compounds with a thiadiazole moiety, namely TF and TPDM, that exhibit strong antiviral activity against SARS-CoV-2. While cinnamic acid itself lacks efficacy against SARS-CoV-2, derivatization with thiadiazole generated novel compounds that significantly reduced viral copy numbers (>94%) at non-toxic concentrations (25 μ M). TF and TPDM showed IC₅₀ values of 19.62 μ M and 17.5 μ M, with selectivity indices of 2.53 and 3.85, respectively, indicating potent inhibition of viral replication. The compounds were synthesized using a novel microwave irradiation method, which proved eco-friendly and highly efficient. Compared to conventional methods (reflux: 47%, stirring: 59%), the microwave approach achieved a higher yield (72%), reduced solvent use (2 mL ethanol), and shortened reaction time (11 minutes). The purity of the final products exceeded 95%. Antiviral efficacy was confirmed through qRT-PCR and plaque assays in Vero cells, showing significant reductions in viral RNA copies and plaque formation. Overall, TF and TPDM represent promising antiviral candidates against SARS-CoV-2, supported by an efficient, green synthesis strategy with potential scalability for therapeutic development.

C. Salicylic acid derived carbon dots (SA-CDS) inhibiting SARS-COV-2 infection and its method of preparation

Name of the patent	:	Salicylic acid derived carbon dots (SA-CDS) inhibiting SARS-COV-2 infection and its method of preparation
Inventor	:	Soma Chattopadhyay, Bharat Bhusan Subudhi, Tompe Krishna Vitthalrao, Koustav Chatterjee, Ipsita Mohanty and Soumyajit Ghosh
Patent Application Number	:	202531031962

Summary of the technology:

Since the global outbreak of COVID-19 caused by the SARS-CoV-2 virus, no single antiviral drug has been universally approved as a definitive cure for SARS-CoV-2 infection. Several repurposed drugs have been used under emergency and there is an ongoing need for novel antiviral agents.

This invention presents a novel approach involving the synthesis of water-soluble salicylic acid-derived carbon dots (SA-CDs), which demonstrate potent antiviral activity against SARS-CoV-2, thereby offering a promising alternative for antiviral therapy.

D. Triptolide and composition thereof for inducing insulin production.

Name of the patent	:	Triptolide and composition thereof for inducing insulin production
Inventor	:	Amaresh Chandra Panda and Susovan Sadhukhan
Patent Application Number	:	202531047374

Summary of the technology:

The worldwide frequency of hyperglycemic/diabetic patients is increasing day by day. Diabetes, which leads to multi-organ disability, is still a headache for clinicians to get rid of the disease completely. This ultimately creates a very high demand for novel therapeutic inventions for the treatment of diabetes. Our present invention relates to a novel use of Triptolide for inducing a high level of insulin from pancreatic beta cells. In contrast to the well-established role of Triptolide as a global transcription blocker, we discovered its effect on beta cell function and activity in terms of insulin expression and secretion. This unexpected pharmacological effect of Triptolide opens a new avenue in the therapeutics of diabetes mellitus. Our invention also encompasses the formulation of Triptolide with the globally used anti-diabetic drug Metformin, providing a combinatorial strategy to treat diabetes, as it results in a marked increase in insulin expression from beta cells. Overall, this discovery redefines the role of Triptolide at the cellular level, enhancing blood glycemic control by stimulating beta-cell activation and insulin secretion.

E. A biomimetic polymeric nanoformulation for management of osteosarcoma.

Name of the patent	:	A biomimetic polymeric nanoformulation for management of osteosarcoma
Inventor	:	Mamoni Dash and Pratigyan Dash
Patent Application Number	:	202531048304

Summary of the technology:

Osteosarcoma is a fast-growing malignant bone tumor with early metastasis, requiring early diagnosis and precise treatment. Conventional therapies often fail due to drug resistance and poor targeting, risking damage to healthy tissues. This invention presents a biomimetic nanoformulation using PLGA nanoparticles coated with K7M2 osteosarcoma cell membranes. These Cell Membrane-Coated Nanoparticles (CMCNPs) deliver siRNA against the Survivin gene, achieving tumour-specific uptake via homotypic recognition.

F. Infectious clones of chikungunya virus.

Name of the patent	:	Infectious clones of chikungunya virus
Inventor	:	Soma Chattopadhyay, Eshna Laha, and Sharad Singh
Patent Application Number	:	202531053475

Summary of the technology:

The invention titled “Infectious Clones of Chikungunya Virus” (Provisional Patent Application No. 202531053475) relates to the development of infectious cDNA clones of Indian strain (IS; GenBank Accession: PP349434.1) and African prototype strain (PS; GenBank Accession: AF369024.2) of Chikungunya virus (CHIKV). Viral genomes (~12 kb) were divided into fragments and sequentially cloned into a pBR322 backbone, yielding icIS-pBR322 and icPS-pBR322. Clone-derived viruses were successfully rescued in mammalian cells and deposited at the Korean Collection for Type Cultures (KCTC) with accession numbers: KCTC 16310BP (icIS virus), KCTC 16311BP (icIS-mCh virus), KCTC 16312BP (icPS virus), and KCTC 16313BP (icPS-mCh virus). These viruses demonstrated replication kinetics and cytopathic effects comparable to parental strains, with mCherry fluorescence evident within 24–48 hours post transfection. The disclosed system enables generation of attenuated strains, vaccine candidates, subgenomic replicons for drug screening, and antiviral assays. It further provides a reverse genetics platform for studying CHIKV replication, host–pathogen interactions, and molecular determinants of virulence and pathogenesis.

G. Pharmaceutical compositions comprising sertaconazole or oxiconazole as efflux pump inhibitors for treating multidrug-resistant *Staphylococcus aureus* infections.

Name of the patent	:	Pharmaceutical compositions comprising sertaconazole or Oxiconazole as efflux pump inhibitors for treating multidrug-resistant <i>Staphylococcus aureus</i> infections
Inventor	:	Tushar Kant Beuria and Suvendu Ojha
Patent Application Number	:	202531053455

Summary of the technology:

This invention highlights the novel repurposing of the FDA-approved antifungal agents sertaconazole and oxiconazole as efflux pump inhibitors (EPIs) to combat multidrug-resistant *Staphylococcus aureus* (MDR-S. aureus). Overexpression of efflux pumps such as norA, norB, and abcA is a major cause of resistance in S. aureus, as these systems expel antibiotics and reduce their intracellular concentrations. The present study demonstrates that sertaconazole and oxiconazole exert strong EPI activity, enhancing the effectiveness of fluoroquinolones (norfloxacin, moxifloxacin) and β -lactams (cefotaxime). In vitro results revealed synergistic effects, with greater than fourfold reductions in minimum inhibitory concentrations (MICs) and marked increases in intracellular drug accumulation. In vivo experiments further confirmed a more than two-log reduction in bacterial load. Mechanistic investigations showed that both agents depolarize the bacterial membrane potential, disrupting the proton motive force required for efflux pump function, thereby improving antibiotic retention without damaging membrane integrity. Notably, sertaconazole synergized most effectively with norfloxacin and cefotaxime, while oxiconazole showed strong synergy with moxifloxacin and cefotaxime. Given the growing global threat of MDR-S. aureus and the challenges in developing new EPIs, the discovery of clinically approved drugs with inherent antibacterial properties offers a cost-effective and rapid strategy to restore antibiotic efficacy.

H. A kit-based method for evaluating and monitoring the efficacy of tuberculosis treatment to develop personalized therapy

Name of the patent	:	A kit-based method for evaluating and monitoring the efficacy tuberculosis treatment to develop personalized therapy
Inventor	:	Sunil Kumar Raghav, Subhasish Prusty and R. Divya

Patent Application Number	:	202531072431
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Summary of the technology:

The present invention relates to the field of tuberculosis therapy. More particularly the present invention provides a kit-based method for evaluating and monitoring the efficacy of tuberculosis treatment to develop and generate personalized therapy plans. The present invention presents a flow cytometry-based assay kit for measuring Nuclear Receptor Co-Repressor 1 (NCOR1) protein levels in macrophages and dendritic cells in the blood and sputum of tuberculosis patients during their treatment regimen to predict the therapy response and its effectiveness, enabling real-time, personalized therapy decisions for both pulmonary and extrapulmonary tuberculosis (TB) disease to generate effective personalized therapy plans.

10. List of Major Technologies transferred in 2025

Title of the technology	Transferred to	Date of transfer	Name of Inventor	Patent Number
Enhancing intra-cellular nitric oxide generation	Byonox Private Ltd.	November 18, 2024	Dr. B. Ravindran	

11. List of significant collaborations (International followed by National) 2025:

Sl. No.	Name of the partner	Type	Date	Duration
International Collaboration				
1	Stitching blockchain for impact foundation	Industry	March 27, 2025	Two years
National Collaboration				
2	Central Council for Research in Homeopathy	Academic	December 04, 2024	Five years
3	ICAR-Central Institute of Freshwater Aquaculture	Academic	December 11, 2024	Three years but extendable upto Five years
4	SEA6 Energy Private Limited Bengaluru	Industry	January 22, 2025	Five years
5	National Research Development Corporation, New Delhi	Industry	February 21, 2025	ten Years
6	AIIMS Bhubaneswar	Academic	February 27, 2025	Five years
7	Berhampur University	Academic	March 04, 2025	Five years
8	CSIR-IMMT	Academic	May 5, 2025	10 years
9	S&T Odisha	Academic	August 12, 2025	Five years
10	Baiya Phytopharma Co. Ltd.	Industry	August 22, 2025	Five years (NDA)
11	Brahma Kamal LLP	Industry	September 17, 2025	Five years

12. List of New Extra Mural Projects in 2025:

Sl. No	Title of the project	PI name	Funding Agency	Project Start Date	Total Cost (in Rs.)
	Advanced bioinformatics center for research in tribal health and regional Wellbeing	Dr. Anshuman Dixit	DBT	November 05, 2024	78.44 Lakhs
	Developing novel therapeutic antibody formulation against breast cancer for Indian population	Dr. Gunjan Mandal	ICMR	January 29, 2025	175.0 Lakhs
	Interplay of malarial PAMPs and DAMPs-regulatory mechanisms and their physiological relevance, association with disease severity and translational potential	Dr. V Arun Nagaraj	ICMR	February 12, 2025	354.98 Lakhs
	Decoding epigenetic landscape of drug resistance in colorectal carcinomas (CRC)	Dr. Rupesh Dash	DBT	May 06, 2025	92.13 Lakhs
	Effects of different cancer associated fibroblast (CAFs) subpopulations on pancreatic tumor Immunomodulation	Dr. Shantibhusan Senapati	DBT	June 16, 2025	95.0 Lakhs
	Genome-wide association mapping of important agronomic traits in the climate-resilient crop little millet (<i>Panicum sumatrense</i>), using a haplotypic-resolved genome assembly of the crop plant	Dr. Seema Pradhan	ANRF	July 09, 2025	54.27 Lakhs
	Multimomics driven insights targeting Host Immunity to heal DFU using therapeutic principles from seaweeds of Odisha coast	Dr. Debabrata Biswas	ANRF	July 22, 2025	49.37 Lakhs
	Exploring the pathobiology of brain aging in Indian population: developing a public domain reference atlas and spatial	Dr. Sunil K. Raghav	ICMR	August 07, 2025	619.0 Lakhs

	transcriptome facility for aging research				
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13. List of Ongoing Extra Mural Projects in 2025:

Sl. No.	Name of the Project	Funding Agency	Duration	Cost of Project	PI Name
1.	Exploring the protein-coding functions of circular RNAs in skeletal muscle cell differentiation	SERB	Three years	56.91 Lakhs	Dr. Amaresh C. Panda
2.	Proteomics study to explore the signature molecules associated with severe pathogenesis of SARS-CoV-2 infection	ICMR	Three years	86.05 Lakhs	Dr. Amol Ratnakar Suryawanshi
3.	Advanced bioinformatics centre for research in tribal health and regional well being	DBT	Three years	78.0 Lakhs	Dr. Anshuman Dixit
4.	A nematode HSP70 immunomodulator for therapeutic intervention of SARS CoV2 in Golden Hamsters	DBT	Three years	39.08 Lakhs	Dr. B. Ravindran
5.	Multiomics driven insights targeting Host Immunity to heal DFU using therapeutic principles from seaweeds of Odisha coast	ANRF	Three years	49.37 Lakhs	Dr. Debabrata Biswas
6.	Setting up of North East region Biotechnology Programme management Cell (NERBPMC) at joint IBSD-ILS Centre at ILS, Bhubaneswar	DBT	Five years	1723.14 Lakhs	Dr. Debasis Dash
7.	Promoting Bio-Entrepreneurship for Addressing Societal Needs	BIRAC	Three years	379.0 Lakhs	Dr. Debasis Dash

8.	Establishment of Biotech-KISAN hub at DBT-ILS, Bhubaneswar for carrying out activities in Tribal districts of Odisha	DBT	Three years	146.0 Lakhs	Dr. Debasis Dash / Dr. Rajeeb Swain
9.	Establishment of Bio Incubation Center at DBT-ILS, Bhubaneswar	Odisha - DST	Three years	1070.60 Lakhs	Dr. Debasis Dash/ Dr. Nivedita Jena
10.	Development of Unified online Portal for utilization of resources/ facilities created under DBT-SAHAJ Infrastructure Programme.	DBT	Three years	45.45 Lakhs	Dr. Debasis Dash
11.	Exploring the Diverse Marine Ecosystems of Odisha for Novel Bioresources with Human Health and Industrial Significance.	MoES, Govt. of India	Two years	8485.0 Lakhs	Dr. Debasis Dash
12.	Harnessing efficiency of spontaneous anti-tumor humoral responses and antibody-based immunotherapies in epithelial malignancies	SERB	Two Years	30.0 Lakhs	Dr. Gunjan Mandal
13.	Developing novel therapeutic antibody formulation against breast cancer for the Indian population	ICMR	Two years	175.0 Lakhs	Dr. Gunjan Mandal
14.	Creation of a national network of existing and upcoming high risk pathogens laboratories (BSL-3/4) labs across departments and keeping their 'interlinkages' functional for use during outbreak response across sectors"	ICMR	19.03.2024	49,60,574.00	Dr. Gulam H Syed

	under NOHM component of PM-ABHIM"				
15.	Cationic polymer Based nanocomplexes for the control of stored grain pests	CSIR	Two years	30.0 Lakhs	Dr. Mamoni Dash
16.	Exosomes-based bone graft material: A personalized product for Bone healing- Exobone- DBT- BIRAC	BIRAC	Three years	50.0 Lakhs	Dr. Mamoni Dash
17.	Genetic analysis of plant pararetrovirus promoter sequence/s for developing universal promoter with enhanced activity in both monocot and dicot plants.	SERB	Three years	40.98 Lakhs	Dr. N. Dey
18.	Development of genomic resources, elite lines and germplasm conservation on high density rootstocks in apple under <i>Himalayan Bioresource Mission</i>	DBT	Three years	46.0 Lakhs	Dr. N. Dey
19.	Long non-coding RNAs in tomato and their role in epigenetic regulation of gene 2.expression upon virus infection.	DST	Three years	35.0 Lakhs	Dr. Namisha Sharma
20.	Elucidating the miRNA-encoded peptide-mediated regulation of miR159 during Tomato leaf curl New Delhi virus infection in tomato	SERB	Two years	27.82 Lakhs	Dr. Namisha Sharma
21.	DNA-Protein Crosslink repair in pathogenic yeast <i>Candida albicans</i>	SERB	Three years	66.75 Lakhs	Dr. Narottam Acharya
22.	Tribal Health and Nutrition: A research initiative to uplift health	DBT	Three years	773.34 Lakhs	Dr. Punit Prasad

	and well being of tribal communities of Odisha				
23.	Evaluation of epigenetic drugs in restricting SARS CoV-2 infection	ICMR	Three years	99.74 Lakhs	Dr. Punit Prasad
24.	Understanding human gut microbiome and its integration with immune profile and antimicrobial resistance incidence in pre, during, and post-COVID-19 subject cohorts using omics approach	ICMR	Three years	165.19 Lakhs	Dr. Punit Prasad
25.	Role of SMARCD isoforms, auxiliary subunits of human SWI/SNF complex in monocyte/macrophage immune response	SERB	Three years	65.55 Lakhs	Dr. Punit Prasad
26.	Understanding the genetic basis of hearing loss using zebrafish model	SERB	Three years	50.86 Lakhs	Dr. P V Ramchander
27.	Screening of pregnant women and newborns for genetic and metabolic disorders in Nabarangpur – an aspirational district in Odisha"	DBT	Three years	340.69 Lakhs	Dr. P V Ramchander
28.	Mission program on paediatric rare genetic disorders	DBT	Four years	210.04 Lakhs	Dr. P V Ramchander/ Dr. Rajeeb Swain
29.	Economic empowerment of Tribal Farming communities in one of the Aspirational District of Odisha	DBT	Six years	146.0 Lakhs	Dr. Rajeeb Swain

30.	Decoding Epigenetic landscape of drug resistance in colorectal carcinomas (CRC)	DBT	Three years	92.13 Lakhs	Dr. Rupesh Dash
31.	Global Profiling of circular RNAs and their novel functions in rewiring cisplatin resistance of OSCC	ICMR	Three years	16.88 Lakhs	Dr. Rupesh Dash
32.	Exploring the potential role of Never in mitosis gene A (NIMA)-related kinase 9 in rewiring docetaxel resistance in oral squamous cell carcinomas	ANRF	Three years	61.23 Lakhs	Dr. Rupesh Dash
33.	Nanoherbicide: A controlled release formulation to improve rice production	DBT	Three years	42.22 Lakhs	Dr. Sanjeeb K. Sahoo
34.	Understanding the enigma of interconnection between inflammatory bowel disease (IBD) and neurodegeneration utilizing genetically predisposed IBD mice model	ICMR	Three years	44.94 Lakhs	Dr. Santosh Chauhan
35.	Deciphering the Immunomodulatory roles of Homeobox A10 in the endometrium during embryo implantation	DBT	Three years	30.75 Lakhs	Dr. Santosh Chauhan
36.	Developing a circular RNA cirRNA profile for the popular legume mungbean (<i>Vigna radiata</i>) and their characterisation in response to salinity stress	CSIR	Two years	22.47 Lakhs	Dr. Seema Pradhan
37.	Genome-wide association mapping of important agronomic traits in the climate-resilient crop little millet (<i>Panicum</i>	ANRF	Three years	54.27 Lakhs	Dr. Seema Pradhan

	<i>sumatrense</i>), using a haplotypic- resolved genome assembly of the crop plant				
38.	Effects of different cancer associated fibroblast (CAFs) subpopulations on pancreatic tumor immunomodulation	DBT	Two years	95.0 Lakhs	Dr. Shantibhusan Senapati
39.	Identification and validation of potential drug candidates against COVID-19-associated lung fibrosis using clinically relevant in vitro and in vivo models	BIRAC	One year	132.10 Lakhs	Dr. Shantibhusan Senapati
40.	Technological innovations for development of functional foods from ethnic fermented foods of the Indian Himalayas	DBT	Three years	71.0 Lakhs	Dr. Shantibhusan Senapati
41.	A Clinical Validation of Organotypic tissue slice and 3D organoid model for chemotherapeutic drug screening for the treatment of Triple-negative breast cancer (TNBC).	ICMR	Three years	40.39 Lakhs	Dr. Shantibhusan Senapati
42.	Advanced Mass Spectrometry platform at ILS Bhubaneswar	DBT	Three years	100.8 Lakhs	Dr. Soma Chattopadhyay
43.	Evaluating genetic determinants of chikungunya virus (CHIKV) towards epidemic potential	DBT	Three years	136.0 Lakhs	Dr. Soma Chattopadhyay
44.	Anti-Viral Screening platform for Viral diseases: with special reference to COVID-19	DBT	Three years	423.71 Lakhs	Dr. Soma Chattopadhyay
45.	Investigating Viroporins essential for viral assembly as target for antiviral design	DBT	Three years	42.94 Lakhs	Dr. Soma Chattopadhyay

46.	Comprehensive transcriptomic and functional analysis of Chronic Myeloid Leukemia-Blast Crisis (CML-BC) with respect to CML-chronic phase (CP) using paired samples of CML	DBT	Four years	67.4 Lakhs	Dr. Soumen Chakraborty
47.	Identification of the kinase and its inhibitor (s) that potentiates irinotecan-induced phosphorylation of the proto-oncogene EVI1 in colon cancer cells	ICMR	Four years	261.0 Lakhs	Dr. Soumen Chakraborty
48.	Documentation and validation of traditional healthcare knowledge of Indian Himalayan region: translational approach	DBT	Three years	454.0 Lakhs	Dr. Sunil K. Raghav
49.	Evaluation of genetic diversity of underutilized species of western Himalayan Bio-resources based on molecular and genomic characterization	DBT	Three years	349.57 Lakhs	Dr. Sunil K. Raghav
50.	Genome India: Cataloguing the genetic variation in Indians	DBT	Four years	227.0 Lakhs	Dr. Sunil K. Raghav
51.	Exploring the pathobiology of brain aging in Indian population: Developing a public domain reference atlas and spatial transcriptome facility for aging research	ICMR	Five years	619.0 Lakhs	Dr. Sunil K. Raghav
52.	Screening and identification of efflux pump inhibitors to combat antibacterial resistance in multi drug resistant S. aureus	SERB	Three years	68.27 Lakhs	Dr. Tushar K.Beuria

53.	Interplay of Malarial PAMPs and DAMPs - Regulatory Mechanisms and their Physiological Relevance, Association with Disease Severity and Translational Potential	ICMR	Three years	354.98 Lakhs	Dr. V. A. Nagraj
54.	Targeting Malaria Parasite Heme Synthesis - A New Intervention Strategy for Malaria Transmission, Prophylaxis and Relapse	ICMR	Three years	99.6 Lakhs	Dr. V. A. Nagraj
55.	Griseofulvin as an adjunct drug for the treatment of cerebral and severe malaria – Preclinical and Phase I studies	BIRAC	One year	48.4 Lakhs	Dr. V. A. Nagaraj

14. Awards, Distinctions and Fellowships (2025):

Sl. No.	Name of the Faculty	Awards, Distinctions and Fellowships
1.	Dr. Amaresh C Panda	Listed among the top 2% highly cited scientists in 2024; published by Stanford University
2.	Dr. Amaresh C Panda	Serves as a Non-Executive Director of a startup company, “RNA Biotech Private Limited”.
3.	Dr. Amaresh C Panda	Served as Associate Editor of peer-reviewed journals, Cellular Molecular Life Sciences and PeerJ.
4.	Dr. Amol Ratnakar Suryawanshi	Life Member & Executive council member: Proteomics Society of India
5.	Dr. Amol Ratnakar Suryawanshi	Member of Human Proteome Organization (HUPO)
6.	Dr. Amol Ratnakar Suryawanshi	Life Member of Laboratory Animals Scientist Association, India
7.	Dr. Amol Ratnakar Suryawanshi	Life Member of Indian Society for Mass Spectrometry (ISMAS)
8.	Dr. Debabrata Biswas	Invited as Chief Speaker for the Annual Seminar 2024-25 of P.G. Department of Botany at Sailabala Women's College, Cuttack
9.	Dr. Gulam H Syed	PLOS Pathogens Associate Editor
10.	Dr. Narottam Acharya	Invited to Guha Research Conference-2024 at Kaziranga, Assam

11.	Dr. Narottam Acharya	Association of Microbiologists of India (AMI)-The First Soshil Kumar Jain Panacea Biotech Award-
12.	Dr P V Ramchander	Elected Fellow of the Telangana Academy of Sciences (FTAS)
13.	Dr P V Ramchander	Elected Executive Council Member, Indian Society of Human Genetics (ISHG)
14.	Dr. Satish Devadas	Participated in global immunology summit (GIS 2024) conducted by BRIC-THSTI (Translational Health Science and Technology Institute), Faridabad
15.	Dr. Soma Chattopadhyay	Winner of the Biotech Hackathon” for demonstrating outstanding Innovation and Problem Solving skills in Biotechnology in “Biotech Hackathon 2024” organized by DBT-ILS Bioincubator on 4th February 2025, under the name of the start-up “PhytoDefense” for blending the traditional knowledge with science
16.	Dr. V. Arun Nagaraj	Selected as a Life member of National Academy of Vector Borne Diseases, India

15. Start-ups/ Entrepreneurship Activities in 2025: Nil

16. Significant events & Outreach activities:

A. 5th Zebrafish Investigators Meeting 2025

Institute of Life Sciences, Bhubaneswar; Centre for Cellular and Molecular Biology (CCMB), Hyderabad and Agharkar Research Institute, Pune jointly organized the 5th Zebrafish Investigators Meeting at ILS - Bhubaneswar from 6th to 8th November 2024. This prestigious conference brought together all the laboratories using zebrafish as a model organism in their research in India. Close to 150 participants, including 25 principal investigators, joined the conference.



B. India International Science Festival (IISF)

India International Science Festival (IISF) is an initiative of Ministry of Science and Technology and Ministry of Earth Science of Government of India in association with Vijnana Bharati which is a science movement with Swadeshi spirit lead by eminent scientists of the country. IISF 2024 was held from 30th Nov-3rd Dec 2024 at IIT Guwahati, Assam. The main purpose of IISF is the celebration of science by all. ILS participated with creative programs and displays for the common people. Large number of students, scientists, and industry were gathered to participate.

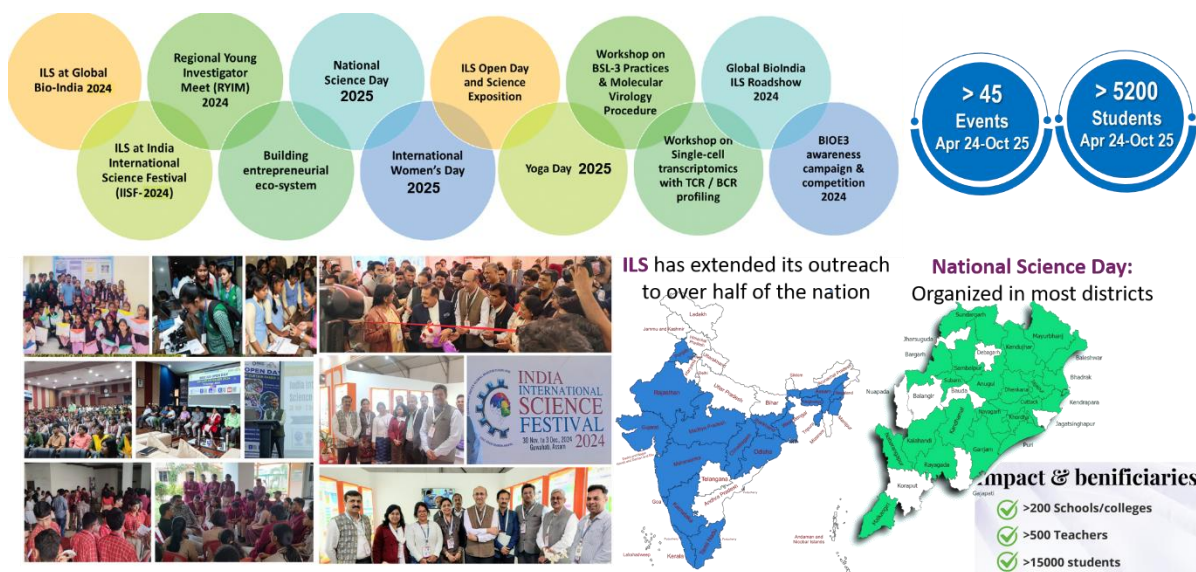


C. National Science Day 2025

The Institute of Life Sciences (ILS) celebrated the National Science Day on February 28, 2025, at its campus and six other locations across Odisha with the theme “Empowering Indian Youth for Global Leadership in Science and Innovation for Viksit Bharat”. In this spirit, seven different teams comprising ten scientists, along with over 50 PhD scholars, postdoctoral fellows, and other support staff, conducted programs at ILS, Bhubaneswar; S. G. Women’s College, Rourkela; Sambalpur University, Sambalpur; MSCBD University, Baripada; Bhadrak Autonomous College, Bhadrak; Ravenshaw University, Cuttack; and Berhampur University, Berhampur. The activities included lectures, games, competitions, demonstrations of experiments, and awareness sessions about innovation and the entrepreneurial ecosystem, all

designed to spark interest in science among the youth. The event saw participation from over 2000 students from various schools & colleges from Odisha across all locations.





D. Bioignite on Entrepreneurship-2024

In a concerted effort to promote entrepreneurial spirit and innovation, the Incubation Center hosted two sessions of Bioignite: Master Class on Entrepreneurship dated 20th – 22nd May 2024 & 11th – 13th June 2024 were organized. These intensive workshops spanned three days, offering participants a deep dive into the intricacies of startup management, business development, funding strategies, and market positioning within the biotechnology sector. Esteemed industry speakers Dr. Shreeram Raghavan, Dr. Viswanadham, Dr. Ramjee Pallela, Ms, Aprajiata, Dr. Vishal Gandhi, Dr. Kamlesh Mishra and other successful entrepreneurs shared their insights, guiding participants through real-world case studies and interactive sessions aimed at refining their entrepreneurial skills and fostering a mindset of innovation and resilience.



E. Educational Visits

Visits to ILS provide students from various institutes with a unique opportunity to experience first-hand cutting-edge scientific research and learning environments. During the visit, the students engaged in interactive sessions with our scientists, explored state-of-the-art

laboratories, and gained insights into exciting career paths in the life sciences. At ILS, we believe in nurturing scientific temper from a young age, and it was heartening to witness the energy and eagerness these young minds brought with them. These young explorers dove into the world of biology, discovering how science helps us understand health and improve the world around us. Their questions were thoughtful and their enthusiasm infectious. This year we have more participation.



17. Research Infrastructure of the Institute:

A. List of high end equipment available for use in SAHAJ portal:

S.no.	Name of facility	List of major equipment in facility
1	Flow cytometry	BD LSR fortessa (OLD)
		BD LSR fortessa (SORP)
		BC Moflo Astrios
		BD FACS Melody
		BC Cytoflex S
2	Imaging/Microscopy	Leica TCS SP 8 (STED) Microscope
		Leica Stellaris 5 Confocal Microscope
		Zeiss Apotome Microscope
		Zeiss Cell Discoverer 7 Microscope
		Leica TCS SP 5 Microscope
		Cell Insight CX7 LZR (High content analyser)
		SEM - FESEM-EDX
3	Sequencing	ABI GENETIC ANALYZER-3500
		Nanopore Sequencing (Oxford)
		NextSeq™ 550
		NovaSeq™ 6000
		Chromium™ Controller
4	Mass Spectrometry	Thermo Scientific Orbitrap Fusion Lumos Mass Spectrometer
		Thermo Scientific TSQ Quantis Plus Triple Quadrupole Mass Spectrometer
5	Immunogenicity assay platform	Cytek Aurora Full Spectra Flow Cytometer
		MESO QUICKPLEX SQ120MM
6	Analytical facilities	X-Ray Diffractometer (XRD)
		Analytical Ultracentrifuge (AUC)

B. Bioincubator:

DBT ILS Bioincubator offers wet labs, private offices, shared equipment, and two unique co-working programs. The abundance of networking opportunities, workshops, and training programs are perfect for people who don't yet require real space. Since 2020, our 16,000-

square-foot facility has been an essential part of the Odisha life science start-up community, holding networking events and providing training as well as meeting space for a variety of activities. The bioincubator is also a state-designated region where technology-based businesses can locate close to all of the community resources that will help them succeed.

18. Services offered by the Institute:

A. Bioincubator offers specialised research facilities on a fee per use basis:

- Offers 14,000 sq. ft. of laboratory and office space and a 2000 sqft training hall on subsidized rent for product innovation and development and training.
- State-of-the-Art Analytical Equipment – Fees on a per-use basis
- Biovalidation (BSL-III) facilities for testing antiviral activity of SARS-CoV-2, Chikungunya, and JEV.
- Includes a Fermentation Unit and other biotechnology-related facilities to support translational and applied research.

One-on-one Mentorship (Regulatory; IP; Fund raising; Market; Product and Business development) **and networking services** for startups through a mentor pool.

B. Animal Experimentation Facility

The Experimental Animal Facility of the Institute is a central facility which procures, imports, breeds and maintains the laboratory animals to meet the requirements of the scientific groups of the Institute. In addition to animal experimentation, experimental animal facility caters to the requirements of private and government institutions in collaborative or fee-for-services mode with regards to animal experiment service and animal supply. For this purpose, the facility registration has been amended for “Research for commercial purpose on small animals (rat, mouse and hamster)” and “Breeding for the purpose of trade of small animals (rat, mouse and hamster)”. The facility works as per the guidelines of CCSEA and guidance of IAEC. Animal experiment can be carried out as per approval of IAEC.

- In 2024-25 the facility produced **10905** animals of different strains and species. In addition, **130** nude mice and **35** NOD-SCID mice were procured for different IAEC -approved research protocols.
- The experimental animal facility of the institute has been registered (No. 76/GO/ReRcBiBt/S/99/CPCSEA) for “**Research for education purpose, research for**

commercial purpose and in-house breeding of small animals for trade purpose” under the Committee for the Control and Supervision of Experiments on Animals (CCSEA), Ministry of Fisheries, Animal Husbandry and Dairying, Deptt. Of Animal Husbandry and Dairying, Government of India and has registered and approved the Institutional Animal Ethics Committee (IAEC) with nine members.

C. Biosafety Level 3 Laboratory Facility and Animal Biosafety Level 3 Laboratory

Facility: The BSL3 laboratory at ILS-Bhubaneswar is a modular facility containing the Virus-culture and Bacterial Culture labs. The facility was commissioned in Mar 2020 and was extensively utilized for COVID-19 testing, isolation and culture of SARS-CoV2 circulating variants, COVID-19 related research activities. The establishment of ABSL-3 animal challenge platform for testing of potential antiviral and vaccine candidates against SARSCoV2 was initiated on 19/01/2021 at DBT-ILS, Bhubaneswar with DBT-BIRAC funding. The ILS-BSL3 and ABSL3 facility has all the required infrastructure for mammalian cell culture based research activity with Risk Group 3 bacterial and/or viral human pathogens. The facility is also being used at DBT-ILS to provide antiviral testing service in fee-for service mode for candidate agents against SARS-CoV2 and COVID-19.

The detailed information on the facilities and services provided by BRIC-ILS is available on <https://sahaj.dbtindia.gov.in/home>.

19. Number of RTIs & Grievances:

No. of RTI Filed	18
No. of RTI rejected	1
No. of RTI Replied	17
No. of RTI appeal filed	2
No. of RTI appeal disposed off	2

20. Budget and Finance: Annexure attached