SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Controlled Release **IF: 10.8**

Title: Biomimetic bright optotheranostics for metastasis monitoring and multimodal image-guided breast cancer therapeutics

Author: R. Prasad , B. Peng , B. B. Mendes , H. I. Kilian., M. Gorain , H. Zhang , G. C. Kundu , J. Xia , J. F. Lovell & J. Conde

Details: Volume 367, January 2024

Abstract: Nanoparticle formulations blending optical imaging contrast agents and therapeutics have been a cornerstone of preclinical theranostic applications. However, nanoparticle-based theranostics clinical translation faces challenges on reproducibility, brightness, photostability, biocompatibility, and selective tumor targeting and penetration. In this study, we integrate multimodal imaging and therapeutics within cancer cell-derived nanovesicles, leading to biomimetic bright optotheranostics for monitoring cancer metastasis. Upon NIR light irradiation, the engineered optotheranostics enables deep visualization and precise localization of metastatic lung, liver, and solid breast tumors along with solid tumor ablation. Metastatic cell-derived nanovesicles (~80 ± 5 nm) are engineered to encapsulate imaging (emissive organic dye and gold nanoparticles) and therapeutic agents (anticancer drug doxorubicin and photothermally active organic indocyanine green dye). Systemic administration of biomimetic bright optotheranostic nanoparticles shows escape from mononuclear phagocytic clearance with (i) rapid tumor accumulation (3 h) and retention (up to 168 h), (ii) real-time monitoring of metastatic lung, liver, and solid breast tumors and (iii) 3-fold image-guided solid tumor reduction. These findings are supported by an improvement of X-ray, fluorescence, and photoacoustic signals while demonstrating a tumor reduction (201 mm^3) in comparison with single therapies that includes chemotherapy (134 mm^3), photodynamic therapy (72 mm^3), and photothermal therapy (88 mm^3). The proposed innovative platform opens new avenues to improve cancer diagnosis and treatment outcomes by allowing the monitorization of cancer metastasis, allowing the precise cancer imaging, and delivering synergistic therapeutic agents at the solid tumor site.

URL: https://www.sciencedirect.com/science/article/pii/S0168365924000713?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

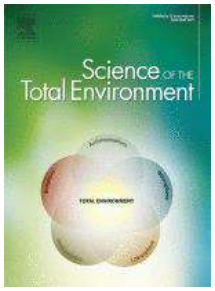
Journal Name: Science of the Total Environment **IF: 9.8**

Title: Proximal discrepancies in intrinsic atomic interaction determines comparative in vivo biotoxicity of Chlorpyrifos and 3,5,6-trichloro-2-pyridinol in embryonic zebrafis

Author: A. Ghosh., S. Singh, U. Saha, S. Jena., F. Z. Simnani , D. Singh, A. Gupta, A. Nandi, A. Sinha, T. Nayak , P.K. Rout, P.K .Panda., D. Singh, V. Raina & S. K.Verma

Details: Volume 913, February 2024

Abstract: Bioaccumulation of Chlorpyrifos (CP) as pesticides due to their aggrandized use in agriculture has raised serious concern on the health of ecosystem and human beings. Moreover, their degraded products like 3,5,6-trichloro-2-pyridinol (TCP) has enhanced the distress due to their unpredictable biotoxicity. This study evaluates and deduce the comparative in vivo mechanistic biotoxicity of CP and TCP with zebrafish embryos through experimental and computational approach. Experimental cellular and molecular analysis showed higher induction of morphological abnormalities, oxidative stress and apoptosis in TCP exposed embryos compared to CP exposure due to upregulation of metabolic enzymes like Zhe1a, Sod1 and p53. Computational analysis excavated the differential discrepancies in intrinsic atomic interaction as a reason of disparity in biotoxicity of CP and TCP. The mechanistic differences were deduced due to the differential accumulation and internalisation leading to variable interaction with metabolic enzymes for oxidative stress and apoptosis causing physiological and morphological abnormalities. The study unravelled the information of in vivo toxicity at cellular and molecular level to advocate the attention of taking measures for management of CP as well as TCP for environmental and human health.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0048969723084103?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Environmental Management **IF: 8.7**

Title: Reducing the environmental impact of rice production in subtropical India by minimising reactive nitrogen loss

Author: Chatterjee D., Das S.R., Mohanty S., Muduli B.C., Bhatia A., Nayak B.K., Rees R.M., Drewer J., Nayak A.K., Adhya T.K., Parameswaran C., Meher J., Mondal B., Sutton M.A., Pathak H.

Details: Volume 354, March 2024, Article Number 120261

Abstract: The future of reactive nitrogen (N) for subtropical lowland rice to be characterised under diverse N-management to develop adequate sustainable practices. It is a challenge to increase the efficiency of N use in lowland rice, as N can be lost in various ways, e.g., through nitrous oxide (N_2O) or dinitrogen (N_2) emissions, ammonia (NH_3) volatilization and nitrate (NO_3^-) leaching. A field study was carried out in the subsequent wet (2021) and dry (2022) seasons to assess the impacts of different N management strategies on yield, N use efficiency and different N losses in a double-cropped rice system. Seven different N-management practices including application of chemical fertilisers, liquid organic fertiliser, nitrification inhibitors, organic nutrient management and integrated nutrient management (INM) were studied. The application of soil test-based neem-coated urea (NCU) during the wet season resulted in the highest economic yield, while integrated nutrient management showed the highest economic yield during the dry season. Total N losses by volatilization of NH_3, N_2O loss and leaching were 0.06–4.73, 0.32–2.14 and 0.25–1.93 kg ha^{-1}, corresponding to 0.06–5.84%, 0.11–2.20% and 0.09–1.81% of total applied N, respectively. The total N-uptake in grain and straw was highest in INM (87–89% over control) followed by the soil test-based NCU (77–82% over control). In comparison, recovery efficiency of N was maximum from application of NCU + dicyandiamide during both the seasons. The N footprint of paddy rice ranged 0.46–2.01 kg N-eq. t^{-1} during both seasons under various N management. Ammonia volatilization was the process responsible for the largest N loss, followed by N_2O emissions, and NO_3^- leaching in these subtropical lowland rice fields. After ranking the different N management practices on a scale of 1–7, soil test-based NCU was considered the best N management approach in the wet year 2021, while INM scored the best in the dry year 2022.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0301479724002470

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Cell Communication and Signaling **IF: 8.4**

Title: The role of Aquaporins in tumorigenesis: implications for therapeutic development

Author: Bhattacharjee, Arkadyuti; Jana, Ankit; Bhattacharjee, Swagato; Mitra, Sankalan; De, Swagata; Alghamdi, Badrah S.; Alam, Mohammad Zubair; Mahmoud, Ahmad Bakur; Al Shareef, Zainab; Abdel-Rahman, Wael M.; Woon-Khiong, Chan; Alexiou, Athanasios; Papadakis, Marios; Ashraf, Ghulam Md

Details: Volume 9, Issue 1, February 2024, Article No. 104

Abstract: Aquaporins (AQPs) are ubiquitous channel proteins that play a critical role in the homeostasis of the cellular environment by allowing the transit of water, chemicals, and ions. They can be found in many different types of cells and organs, including the lungs, eyes, brain, glands, and blood vessels. By controlling the osmotic water flux in processes like cell growth, energy metabolism, migration, adhesion, and proliferation, AQPs are capable of exerting their regulatory influence over a wide range of cellular processes. Tumour cells of varying sources express AQPs significantly, especially in malignant tumours with a high propensity for metastasis. New insights into the roles of AQPs in cell migration and proliferation reinforce the notion that AQPs are crucial players in tumour biology. AQPs have recently been shown to be a powerful tool in the fight against pathogenic antibodies and metastatic cell migration, despite the fact that the molecular processes of aquaporins in pathology are not entirely established. In this review, we shall discuss the several ways in which AQPs are expressed in the body, the unique roles they play in tumorigenesis, and the novel therapeutic approaches that could be adopted to treat carcinoma.

URL: https://biosignaling.biomedcentral.com/articles/10.1186/s12964-023-01459-9

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

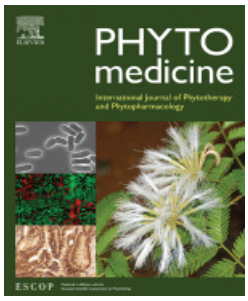
Journal Name: Phytomedicine **IF: 7.9**

Title: Regulation of neuroinflammation in Alzheimer's disease via nanoparticle-loaded phytocompounds with anti-inflammatory and autophagy-inducing properties

Author: V. Nayak , S. Patra , S. Rout , A. B. Jena , R. Sharma , K. P. Pattanaik., J.Singh , S. S. Pandey , R. P. Singh , S. Majhi ., K.R. Singh & R.G. Kerry

Details: Volume 122, January 2024

Abstract: Background: Alzheimer's disease (AD) is characterized by neuroinflammation linked to amyloid β (Aβ) aggregation and phosphorylated tau (τ) protein in neurofibrillary tangles (NFTs). Key elements in Aβ production and NFT assembly, like γ-secretase and p38 mitogen-activated protein kinase (p38MAPK), contribute to neuroinflammation. In addition, impaired proteosomal and autophagic pathways increase Aβ and τ aggregation, leading to neuronal damage. Conventional neuroinflammation drugs have limitations due to unidirectional therapeutic approaches and challenges in crossing the Blood-Brain Barrier (BBB). Clinical trials for non-steroidal anti-inflammatory drugs (NSAIDs) and other therapeutics remain uncertain. Novel strategies addressing the complex pathogenesis and BBB translocation are needed to effectively tackle AD-related neuroinflammation. Purpose: The current scenario demands for a much-sophisticated theranostic measures which could be achieved via customized engineering and designing of novel nanotherapeutics. As, these therapeutics functions as a double edge sword, having the efficiency of unambiguous targeting, multiple drug delivery and ability to cross BBB proficiently. Results: In this study, polymeric nanoparticles loaded with specific phytocompounds and coated with an antibody targeting the transferrin receptor (anti-TfR) present on BBB. Thereafter, the engineered nanoparticles with the ability to efficiently traverse the BBB and interact with target molecules within the brain, could induce autophagy, a cellular process crucial for neuronal health, and exhibit potent anti-inflammatory effects. Henceforth, the proposed combination of desired phytocompounds, polymeric nanoparticles, and anti-TfR coating presents a promising approach for targeted drug delivery to the brain, with potential implications in neuroinflammatory conditions such as Alzheimer's disease.



URL: https://www.sciencedirect.com/science/article/pii/S0944711323005093?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Biomedicine and Pharmacotherapy **IF: 7.5**

Title: The posterity of Zebrafish in paradigm of in vivo molecular toxicological profiling

Author: Suresh K. Verma, Aditya Nandi, Adrija Sinha,Paritosh Patel, Swabhiman Mohanty, Ealisha Jha, Snehasmita Jena, Puja Kumari, Aishee Ghosh, Ivan Jerman, Raghuraj Singh Chouhan, Ateet Dutt, Shailesh Kumar Samal, Yogendra Kumar Mishra, Rajender S. Varma, Pritam Kumar Panda, Nagendra Kumar Kaushik, Deobrat Singh, Mrutyunjay Suar

Details: Volume 171, January 2024

Abstract: The aggrandised advancement in utility of advanced day-to-day materials and nanomaterials has raised serious concern on their biocompatibility with human and other biotic members. In last few decades, understanding of toxicity of these materials has been given the centre stage of research using many in vitro and in vivo models. Zebrafish (*Danio rerio*), a freshwater fish and a member of the minnow family has garnered much attention due to its distinct features, which make it an important and frequently used animal model in various fields of embryology and toxicological studies. Given that fertilization and development of zebrafish eggs take place externally, they serve as an excellent model organism for studying early developmental stages. Moreover, zebrafish possess a comparable genetic composition to humans and share almost 70% of their genes with mammals. This particular model organism has become increasingly popular, especially for developmental research. Moreover, it serves as a link between in vitro studies and in vivo analysis in mammals. It is an appealing choice for vertebrate research, when employing high-throughput methods, due to their small size, swift development, and relatively affordable laboratory setup. This small vertebrate has enhanced comprehension of pathobiology and drug toxicity. This review emphasizes on the recent developments in toxicity screening and assays, and the new insights gained about the toxicity of drugs through these assays. Specifically, the cardio, neural, and, hepatic toxicology studies inferred by applications of nanoparticles have been highlighted.

URL: https://www.sciencedirect.com/science/article/pii/S0753332224000416?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

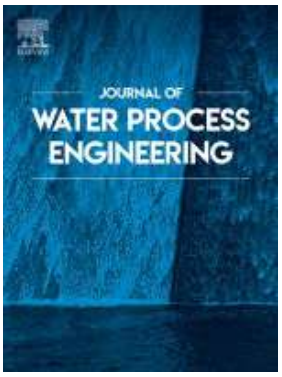
Journal Name: Journal of Water Process Engineering **IF: 7.0**

Title: Advancing pharmaceutical wastewater treatment: A comprehensive review on application of catalytic membrane reactor-based hybrid approaches

Author: Ramesh Kumar, Elinah Awino, Dorcas Wanja Njeri , Aradhana Basu, Sujoy Chattaraj , Jayato Nayak , Snehagni Roy , Gausal A. Khan , Byong Hun Jeon , Alak Kumar Ghosh , Shrabana Pal , Shirsendu Banerjee , Prabhat Rout , Sankha Chakrabortty , Suraj K. Tripathy

Details: Volume 58, February 2024, Article number 104838

Abstract: Pharmaceutical wastewater presents a concerning array of toxic chemicals, necessitating proper treatment and disposal to safeguard human health and the environment. These chemicals, including active pharmaceutical ingredients, antibiotics, solvents, and organic compounds, exhibit toxicity, flammability, and carcinogenicity, posing risks to living beings and ecosystems. Contaminants such as surfactants, emulsifiers, residual drugs, and metabolites further exacerbate the complexity of pharmaceutical wastewater. Conventional treatment technologies, such as activated carbon adsorption, oxidation processes, membrane filtration, and biological treatment, suffer limitations in effectively removal or neutralizing hazardous substances for the safe disposal of pharmaceutical wastewater if implemented individually. In particular, combining photocatalysis with membrane technology demonstrates promising benefits, enhancing degradation efficiency and reducing membrane fouling. Membrane catalytic reactors (MCRs) integrated with advanced oxidation systems, viz. photocatalysis, Fenton-based processes, ozonation, persulphate generation, and the electrocatalytic process, can degrade pollutants and realize their physical separation. The present review manuscript comprehensively discusses detailed mechanisms, performance, influencing factors, and generation of catalytic radicals for removing organic pollutants in hybrid MCRs to improve water quality and safeguard ecosystems from wastewater.



URL: https://www.sciencedirect.com/science/article/abs/pii/S2214714424000680

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Life Sciences **IF: 6.1**

Title: The role of viruses in cancer progression versus cancer treatment: A dual paradigm

Author: Somya Ranjan Dash, Anushka Kundu, Chanakya Nath Kundu

Details: Volume 341, 15 March 2024, Article number 122506

Abstract: Most human malignancies are attributed to exposure to infectious organisms such as viruses. Certain infections that can induce cancer can evade the immune system, leading to persistent inflammation that facilitates uncontrolled cell growth. Moreover, these pathogens can increase the likelihood of oncogenic transformation, leading to cancer development. Despite significant advancements in medicine, oncological research continues to seek innovative treatment techniques in light of the constraints imposed by traditional therapeutic agents. Virus-based therapy is a novel treatment method that has garnered significant interest due to its broad range of applications. Virotherapy employs oncolytic viruses that are genetically modified to target tumor cells specifically, undergo replication inside them and destroy the malignant cells. Additionally, this therapeutic approach elicits an anticancer response by boosting the patient's immune system. In addition, viruses are commonly employed as targeted delivery vectors for the precise transportation of various genes, medicinal compounds and immune-stimulating substances. Furthermore, virotherapy offers more excellent anticancer activity in combination with established treatment modalities such as immune therapy, chemotherapy and radiation therapy. This review presents a concise overview of the roles played by infectious agents, such as viruses in cancer progression. In addition, we have thoroughly summarized the advancements in utilizing viruses for their oncolytic properties in conjunction with established cancer treatment modalities such as chemotherapy, radiation and immunotherapy.

URL: https://www.sciencedirect.com/science/article/pii/S002432052400095X?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Environmental and Experimental Botany **IF:5.7**

Title: PgWRKY44, a pearl millet WRKY transcription factor-Calmodulin module, enhances salt and drought stress resilience in transgenic plants

Author: Jeky Chanwala , Deepak Kumar Jha , Mrunmay Kumar Giri & Nrisingha Dey

Details: Volume 219, December 2023

Abstract: WRKY transcription factors (TFs) regulate signal transduction pathways during stress response and can also modulate the activity of downstream genes through binding to their cognate W-box elements [(T) TGAC(C/T)]. Previous studies have identified and *in-silico* characterized WRKY family members in millets. However, their functional elucidation and molecular mechanism in millets remain vastly unexplored. In this study, a pearl millet WRKY TF (PgWRKY44) belonging to Group IId was characterized, and its ectopic expression in Arabidopsis was found to be positively regulating abiotic stress tolerance in transgenic plants through ABA-mediated signalling. Also, reduced accumulation of reactive oxygen species (ROS) and up-regulation of stress-related genes confirmed improved defense systems of transgenic plants upon abiotic stress treatments. Functional network analysis and expression data indicated towards co-regulation of multiprotein bridging factor (MBF1C), HSFs, and calmodulin (CAM) members with *PgWRKY44* in response to osmotic stress. Yeast one-hybrid also confirmed W-box-dependent binding of PgWRKY44. These findings enriched our understanding of the PgWRKY44 functions in pearl millet and exhibited its potential application in developing climate-resilient crop plants.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0098847223004240?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Nutritional Biochemistry **IF: 5.6**

Title: Nano formulated Resveratrol inhibits PD-L1 in oral cancer cells by deregulating the association between tumor associated macrophages and cancer associated fibroblasts through IL-6/JAK2/STAT3 signaling axis

Author: R. Pradhan , S. Paul , S. S. Acharya , S. Sinha , S. R. Dash & C. N. Kundu

Details: Volume 125, January 2024

Abstract: Tumor associated macrophages (TAMs) and cancer-associated fibroblasts (CAFs) in the tumor microenvironment secrete several cytokines, which involved in tumor initiation, progression, metastatic outgrowth and angiogenesis. However, the association between TAMs and CAFs in the context of tumor development remain unclear. Here, we studied the relationship between TAMs and CAFs along with the involvement of cytokines in the production of cancer-stem-like-cells (CSCs) in oral cancer cells and explored the potential anticancer effects of Nano-formulated Resveratrol (Res-NP) using an activated macrophage-M1 (AM-M1) and activated fibroblast cells as the model system. IL-6 secretion was found to be enhanced in the conditioned-medium (CM) when AM-M1 cells + CAFs-like cells were cocultured together. CSCs-enriched population was developed after addition of CM of AM-M1 +CAFs in H-357 cells and patient-derived-primary-oral-cancer cells. AM-M1 cells+ CAFs-like cells secreted IL-6 enhanced CSCs growth, proliferation, metastasis, and angiogenesis. IL-6 was found to promote PD-L1 expression in CSCs-enriched cells via JAK2/STAT3 pathway, as evident from the enhanced expression of p-JAK2 and p-STAT3. Nevertheless, Res-NP inhibited CSCs proliferation and reduced the expression of metastatic and angiogenic markers, in ovo blood vascularization, NO production and MMPs expression. Res-NP delinked the association between AM-M1 and CAFs by blocking IL-6 production and also disrupted the potential connection between IL-6 and PD-L1 with considerable decrease in p-JAK2 and p-STAT3 expressions. IL-6 depletion inhibited stemness and angiogenesis in oral CSCs by downregulating PD-L1 via JAK2/STAT3 cascade. Similar observations were also observed in Res-NP treated xenograft mice. Thus, data demonstrate that CSCs growth is dependent on IL-6/PD-L1 axis. Res-NP deregulates the association between AM-M1 and CAFs along-with attenuates carcinogenesis in in vitro, in ovo, ex vivo and in vivo model systems by inhibiting PD-L1 via IL-6/JAK2/STAT3 axis.

URL: https://www.sciencedirect.com/science/article/pii/S0955286324000020?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: FEBS Journal **IF: 5.4**

Title: Myosin heavy chain-perinatal regulates skeletal muscle differentiation, oxidative phenotype and regeneration

Author: Akashi Sharma, Aatifa Zehra, Sam J. Mathew

Details: February, 2024

Abstract: Myosin heavy chain-perinatal (MyHC-perinatal) is one of two development-specific myosin heavy chains expressed exclusively during skeletal muscle development and regeneration. The specific functions of MyHC-perinatal are unclear, although mutations are known to lead to contracture syndromes such as Trismus-pseudocamptodactyly syndrome. Here, we characterize the functions of MyHC-perinatal during skeletal muscle differentiation and regeneration. Loss of MyHC-perinatal function leads to enhanced differentiation characterized by increased expression of myogenic regulatory factors and differentiation index as well as reduced reserve cell numbers in vitro. Proteomic analysis revealed that loss of MyHC-perinatal function results in a switch from oxidative to glycolytic metabolism in myofibers, suggesting a shift from slow type I to fast type IIb fiber type, also supported by reduced mitochondrial numbers. Paracrine signals mediate the effect of loss of MyHC-perinatal function on myogenic differentiation, possibly mediated by non-apoptotic caspase-3 signaling along with enhanced levels of the pro-survival apoptosis regulator Bcl2 and nuclear factor kappa-B (NF-κB). Knockdown of MyHC-perinatal during muscle regeneration in vivo results in increased expression of the differentiation marker myogenin (MyoG) and impaired differentiation, evidenced by smaller myofibers, elevated fibrosis and reduction in the number of satellite cells. Thus, we find that MyHC-perinatal is a crucial regulator of myogenic differentiation, myofiber oxidative phenotype and regeneration.

URL: https://febs.onlinelibrary.wiley.com/doi/10.1111/febs.17085

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

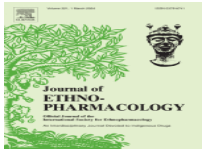
Journal Name: Journal of Ethnopharmacology **IF: 5.4**

Title: Phytochemical screening, antioxidant analyses, and in vitro and in vivo antimalarial activities of herbal medicinal plant - Rotheca serrata (L.) Steane & Mabb.

Author: Wahengbam Kabita Chanu , Aditi Chatterjee , Nalini Singh , Viswanathan Arun Nagaraj & Chingakham Brajakishor Singh

Details: Volume 321, March 2024

Abstract: Ethnopharmacological relevance: Malaria is a major global health concern that is presently challenged by the emergence of Plasmodium falciparum (Pf) resistance to mainstay artemisinin-based combination therapies (ACTs). Hence, the discovery of novel and effective antimalarial drugs is pivotal to treating and controlling malaria. For many years, traditional plant-based herbal medicines have been employed in the treatment of various illnesses. Rotheca serrata (L.) Steane & Mabb. belongs to the Lamiaceae family that has been traditionally used to treat, cure, and prevent numerous diseases including malaria. Aim The present investigation sought to assess the phytoconstituents, antioxidant, cytotoxicity, antimalarial activities of *Rotheca serrata* extract and its fractions. The *in vitro* antiplasmodial activity was assessed in chloroquine-sensitive *Pf*3D7 and artemisinin-resistant *Pf*Cam3.I^{R539T} cultures, and the *in vivo* antimalarial activity was analyzed in Plasmodium berghei (*Pb*) ANKA strain-infected BALB/c mouse model.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0378874123013363?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Ethnopharmacology **IF: 5.4**

Title: Phytochemically analysed extract of Ageratina adenophora (Sprengel) R.M.King & H. Rob. initiates caspase 3-dependant apoptosis in colorectal cancer cell: A synergistic approach with chemotherapeutic drugs

Author: K.D. Chanu, S. Thoithoisana , A. Kar , P. K. Mukherjee ,P. Radhakrishnanand , K. Parmar, & Sharma N.

Details: Volume 322, March 2024

Abstract: Ethnopharmacological relevance Ageratina *adenophora* (Sprengel) R.M.King & H.Rob. has been used as traditional indigenous medicine all across the globe for its diverse therapeutic applications such as anticancer, analgesic, antipyretic, thermogenic, antiseptic, antimicrobial as well as astringent. The various ethnic groups of India use plant parts to treat cuts and wounds, venomous insect bites, skin lesions, blisters, scabies and other skin irritations, gastritis and indigestion problems, cough, stomach ache and dysentery. The Portuguese traditionally extract the juice from the plant and use it for cancer, diabetes, liver disorder, gallbladder and stomach ailments. Nigerian healers use different parts of the plant to treat diabetes, fever and inflammation. Results The AHL induced cytotoxic activity significantly in HCT-116 with IC_{50} of 65.65 ± 2.10 µg/mL, but non-cancerous cell HeK-293 was least cytotoxic. Colony formation and cell migration were inhibited in a dose and time dependent manner. The cell morphology upon AHL treatment was significantly altered with apoptotic features. The extract was rich in total phenolic (82.09 ± 0.35mgGAE/g) and total flavonoid (58.31 ± 0.55 mgQAE/g) contents. AHL induced apoptosis as detected by AnnexinV/PI, via activation of caspase 3 and elevated production of Reactive oxygen species (ROS). AHL in combination with 5FU and Cisplatin acts synergistically and potentiates the therapeutic properties of the extract. Sesquiterpenes, phenolic as well as flavonoid derivatives with anticancer properties were detected in AHL by HRLCMS, and these phytoconstituents may be attributed for anticancer property of AHL.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0378874123014617?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: **Polymer Composites** **IF: 5.2**

Title: Influence of surface-treatment of bamboo fiber on the physico-mechanical properties of bamboo fiber composites with virgin and recycled high-density polyethylen

Author: **S.** Mohanta , P. Mahalik , G. P. Hota , B. B. Sahoo , S. S. Pradhan & S. P. Mohanty

Details: Volume 45, Issue 01, October2023

Abstract: Natural fiber-reinforced composites are showing promising results compared to synthetic fiber-reinforced composites. Therefore, the present work highlights the utilization of chemically treated bamboo-fiber (BF) for the preparation of bamboo-fiber high-density polyethylene composites (BF/HDPE). Both virgin HDPE and recycled HDPE (r-HDPE) are considered for the preparation of bamboo fiber (BF) composite and their physico-mechanical properties are evaluated. On alkali and stearic acid treatment, more fibrillation and surface roughness are observed in the BF surface which created more contacting surfaces to improve the interfacial interaction between the BF and HDPE & r-HDPE matrix. The tensile strength of stearic acid-treated BF/HDPE is increased by 9.26% and stearic acid-treated BF- rHDPE shows an increment of 16.5%. Similar observations are made for impact strength which confirms the improved dispersion of BF in both matrices. The improved interfacial bonding between BFs and HDPE matrix and good dispersion between fibers and matrix can further be confirmed through the SEM images of composite fractured surfaces and FTIR analysis. Highlights: Surface of BF has been modified by NaOH and stearic acid treatment. Modified fibers are used as reinforcement in virgin and r-HDPE composites. Stearic acid treatment enhances the tensile strength of composites. Surface modification has significant impact on r-HDPE composites.

URL: https://4spepublications.onlinelibrary.wiley.com/doi/10.1002/pc.27825

SCHOLARLY PUBLICATIONS
School of Computer Engineering
KIIT Deemed to be University

Journal Name: Journal of Insects as Food and Feed **IF: 5.1**

Title: Heteropterans: a treasure trove of therapeutic proteins

Author: Devi M.R., Koijam A.S., Brockmann A., Rajashekar Y.

Details: Volume 8, Pages 1 – 26, 2024

Abstract: Heteroptera belongs to a group of highly diversified insect forms ranging from plant feeders, blood-feeders, predators, scavengers, detritivores, and fungivores with terrestrial or aquatic habitats. These insects have been used in entomophagy and entomotherapeutic practices. Edible insects are a source of essential bioactive secondary metabolites and bioactive peptides, having nutraceutical potential to deal with metabolic disorders. Various venomous peptides from heteropterans with therapeutic properties have been reported and are constantly being investigated for various medical conditions. This review enlists heteropteran edible insects and bioactive peptides identified from heteropterans for use as an alternative medicine. The heteropteran categories and feeding habits have been briefly outlined. The role of bioinformatics in putting up a translational aspect of insect venom has been discussed. Further, the possible exploration of therapeutic function-based proteins and peptides and the need for advanced studies using modern bioinformatics tools, and scientific validation processes are also discussed.

URL: https://brill.com/view/journals/jiff/aop/article-10.1163-23524588-00001062

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

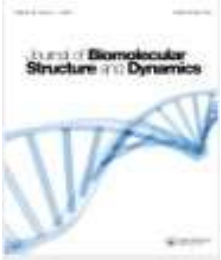
Journal Name: Journal of Biomolecular Structure and Dynamics **IF: 4.4**

Title: Identification of potential inhibitor against CTX-M-3 and CTX-M-15 proteins: an in silico and inÂ vitro study

Author: B. Kar , C. N. Kundu, M. K. Singh, B. Dehury , S. Pati & D. Bhattacharya.

Details: Volume 42, Issue 01, January 2024

Abstract: Extended-spectrum beta-lactamase (ESBL) producing Enterobacteriaceae infection is a serious global threat. ESBLs target 3rd generation cephalosporin antibiotics, the most commonly prescribed medicine for gram-negative bacterial infections. As bacteria are prone to develop resistance against market-available ESBL inhibitors, finding a novel and effective inhibitor has become mandatory. Among ESBL, the worldwide reported two enzymes, CTX-M-15 and CTX-M-3, are selected for the present study. CTX-M-3 protein was modeled, and two thousand phyto-compounds were virtually screened against both proteins. After filtering through docking and pharmacokinetic properties, four phyto-compounds (catechin gallate, silibinin, luteolin, uvaol) were further selected for intermolecular contact analysis and molecular dynamics (MD) simulation. MD trajectory analysis results were compared, revealing that both catechin gallate and silibinin had a stabilizing effect against both proteins. Silibinin having the lowest docking score, also displayed the lowest MIC (128 µg/mL) against the bacterial strains. Silibinin was also reported to have synergistic activity with cefotaxime and proved to have bactericidal effect. Nitrocefin assay confirmed that silibinin could inhibit beta-lactamase enzyme only in living cells, unlike clavulanic acid. Thus the present study validated the CTX-M inhibitory activity of silibinin both in silico and in vitro and suggested its promotion for further studies as a potential lead. The present study adopted a protocol through the culmination of bioinformatics and microbiological analyses, which will help future researchers identify more potential leads and design new effective drugs. Communicated by Ramaswamy H. Sarma.



URL: https://www.tandfonline.com/doi/full/10.1080/07391102.2023.2192811

SCHOLARLY PUBLICATIONS
School of School of Biotechnology
KIIT Deemed to be University

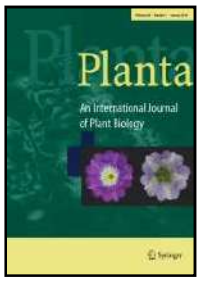
Journal Name: Planta **IF: 4.3**

Title: Unraveling the involvement of WRKY TFs in regulating plant disease defense signaling

Author: Saha, Baisista; Nayak, Jagatjeet; Srivastava, Richa; Samal, Swarnmala; Kumar, Deepak; Chanwala, Jeky; Dey, Nrisingha; Giri, Mrunmay Kumar

Details: Volume 259, Issue 1, Article No. 7, January 2024

Abstract: Main conclusionThis review article explores the intricate role, regulation, and signaling mechanisms of WRKY TFs in response to biotic stress, particularly emphasizing their pivotal role in the trophism of plant-pathogen interactions.AbstractTranscription factors (TFs) play a vital role in governing both plant defense and development by controlling the expression of various downstream target genes. Early studies have shown the differential expression of certain WRKY transcription factors by microbial infections. Several transcriptome-wide studies later demonstrated that diverse sets of WRKYs are significantly activated in the early stages of viral, bacterial, and fungal infections. Furthermore, functional investigations indicated that overexpression or silencing of certain WRKY genes in plants can drastically alter disease symptoms as well as pathogen multiplication rates. Hence the new aspects of pathogen-triggered WRKY TFs mediated regulation of plant defense can be explored. The already recognized roles of WRKYs include transcriptional regulation of defense-related genes, modulation of hormonal signaling, and participation in signal transduction pathways. Some WRKYs have been shown to directly bind to pathogen effectors, acting as decoys or resistance proteins. Notably, the signaling molecules like salicylic acid, jasmonic acid, and ethylene which are associated with plant defense significantly increase the expression of several WRKYs. Moreover, induction of WRKY genes or heightened WRKY activities is also observed during ISR triggered by the beneficial microbes which protect the plants from subsequent pathogen infection. To understand the contribution of WRKY TFs towards disease resistance and their exact metabolic functions in infected plants, further studies are required. This review article explores the intrinsic transcriptional regulation, signaling mechanisms, and hormonal crosstalk governed by WRKY TFs in plant disease defense response, particularly emphasizing their specific role against different biotrophic, hemibiotrophic, and necrotrophic pathogen infections.



URL: https://link.springer.com/article/10.1007/s00425-023-04269-y

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

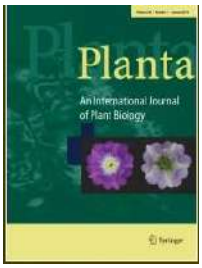
Journal Name: Planta **IF: 4.3**

Title: Unraveling the involvement of WRKY TFs in regulating plant disease defense signaling

Author: B. Saha , J. Nayak , R. Srivastava , S. Samal , D. Kumar , J. Chanwala , N. Dey , M. K Giri

Details: Volume 259, Issue 01, November 2023

Abstract: Main conclusion: This review article explores the intricate role, regulation, and signaling mechanisms of WRKY TFs in response to biotic stress, particularly emphasizing their pivotal role in the trophism of plant-pathogen interactions. Abstract: Transcription factors (TFs) play a vital role in governing both plant defense and development by controlling the expression of various downstream target genes. Early studies have shown the differential expression of certain WRKY transcription factors by microbial infections. Several transcriptome-wide studies later demonstrated that diverse sets of WRKYs are significantly activated in the early stages of viral, bacterial, and fungal infections. Furthermore, functional investigations indicated that overexpression or silencing of certain WRKY genes in plants can drastically alter disease symptoms as well as pathogen multiplication rates. Hence the new aspects of pathogen-triggered WRKY TFs mediated regulation of plant defense can be explored. The already recognized roles of WRKYs include transcriptional regulation of defense-related genes, modulation of hormonal signaling, and participation in signal transduction pathways. Some WRKYs have been shown to directly bind to pathogen effectors, acting as decoys or resistance proteins. Notably, the signaling molecules like salicylic acid, jasmonic acid, and ethylene which are associated with plant defense significantly increase the expression of several WRKYs. Moreover, induction of WRKY genes or heightened WRKY activities is also observed during ISR triggered by the beneficial microbes which protect the plants from subsequent pathogen infection. To understand the contribution of WRKY TFs towards disease resistance and their exact metabolic functions in infected plants, further studies are required. This review article explores the intrinsic transcriptional regulation, signaling mechanisms, and hormonal crosstalk governed by WRKY TFs in plant disease defense response, particularly emphasizing their specific role against different biotrophic, hemibiotrophic, and necrotrophic pathogen infections.



URL: https://link.springer.com/article/10.1007/s00425-023-04269-y

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: ACS Omega **IF: 4.1**

Title: Poly(d,l-lactide-co-glycolide) Surface-Anchored Biotin-Loaded Irinotecan Nanoparticles for Active Targeting of Colon Cancer

Author: Giram, Prabhanjan S.; Nimma, Ramakrishna; Bulbule, Anuradha; Yadav, Amit Singh; Gorain, Mahadeo; Radharani, Nalukurthi Naga Venkata; Kundu, Gopal C.; Garnaik, Baijayantimala

Details: Volume 9, Issue 3, January 2024, Pages 3807–3826

Abstract: A poly-(d,l-lactide-co-glycolide) (PLGA) copolymer was synthesized using the ring-opening polymerization of d,l-lactide and glycolide monomers in the presence of zinc proline complex in bulk through the green route and was well characterized using attenuated total reflectance-Fourier transform infrared, H-1 and C-13 nuclear magnetic resonance, gel permeation chromatography, differential scanning calorimetry, X-ray diffraction, matrix-assisted laser desorption/ionization time-of-flight, etc. Furthermore, PLGA-conjugated biotin (PLGA-B) was synthesized using the synthesized PLGA and was employed to fabricate nanoparticles for irinotecan (Ir) delivery. These nanoparticles (PLGA-NP-Ir and PLGA-B-NP-Ir) were tested for physicochemical and biological characteristics. PLGA-B-NP-Ir exhibited a stronger cellular uptake and anticancer activity as compared to PLGA-NP-Ir in CT-26 cancer cells (log $p < 0.05$). The accumulation and retention of fluorescence-labeled nanoparticles were observed to be better in CT-26-inoculated solid tumors in Balb/c mice. The PLGA-B-NP-Ir-treated group inhibited tumor growth significantly more (log $p < 0.001$) than the untreated control, PLGA-NP-Ir, and Ir-treated groups. Furthermore, no body weight loss, hematological, and blood biochemical tests demonstrated the nanocarriers' nontoxic nature. This work presents the use of safe PLGA and the demonstration of a proof-of-concept of biotin surface attached PLGA nanoparticle-mediated active targeted Ir administration to combat colon cancer. To treat colon cancer, PLGA-B-NP-Ir performed better due to specific active tumor targeting and greater cellular uptake due to biotin.

URL: https://pubs.acs.org/doi/10.1021/acsomega.3c07833

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: ACS Omega **IF: 4.1**

Title: 4-Alkyl EGCG Derivatives Induce Cytoprotective Autophagy Response by Inhibiting EGFR in Glioblastoma Cells

Author: Satyam Sigh ; Priya Ghosh; Ananyaashree Behera ; Revathy Sahadevan ; Parimal Kar: Sushabhan Sadhukhan & Avinash Sonawane

Details: Volume 9, Issue 2, January 2024

Abstract: Epidermal growth factor receptor (EGFR)-targeted therapy has been proven vital in the last two decades for the treatment of multiple cancer types, including nonsmall cell lung cancer, glioblastoma, breast cancer and head and neck squamous cell carcinoma. Unfortunately, the majority of approved EGFR inhibitors fall into the drug resistance category because of continuous mutations and acquired resistance. Recently, autophagy has surfaced as one of the emerging underlying mechanisms behind resistance to EGFR-tyrosine kinase inhibitors (TKIs). Previously, we developed a series of 4″-alkyl EGCG (4″-Cn EGCG, n = 6, 8, 10, 12, 14, 16, and 18) derivatives with enhanced anticancer effects and stability. Therefore, the current study hypothesized that 4″-alkyl EGCG might induce cytoprotective autophagy upon EGFR inhibition, and inhibition of autophagy may lead to improved cytotoxicity. In this study, we have observed growth inhibition and caspase-3-dependent apoptosis in 4″-alkyl EGCG derivativetreated glioblastoma cells (U87-MG). We also confirmed that 4″-alkyl EGCG could inhibit EGFR in the cells, as well as mutant L858R/T790M EGFR, through an in vitro kinase assay. Furthermore, we have found that EGFR inhibition with 4″-alkyl EGCG induces cytoprotective autophagic responses, accompanied by the blockage of the AKT/mTOR signaling pathway. In addition, cytotoxicity caused by 4″-C_{10} EGCG, 4″-C_{12} EGCG, and 4″-C_{14} EGCG was significantly increased after the inhibition of autophagy by the pharmacological inhibitor chloroquine. These findings enhance our understanding of the autophagic response toward EGFR inhibitors in glioblastoma cells and suggest a potent combinatorial strategy to increase the therapeutic effectiveness of EGFR-TKIs.

URL: https://pubs.acs.org/doi/10.1021/acsomega.3c06110

SCHOLARLY PUBLICATIONS
School of School of Biotechnology
KIIT Deemed to be University

Journal Name: ACS OMEGA **IF: 4.1**

Title: Antibacterial Efficacy of ZnO/Bentonite (Clay) Nanocomposites against Multidrug-Resistant Escherichia coli

Author: S. K. Behera, G. A. Khan, S.S. Singh, B. Jena, K. Sashank,S. Patnaik, R. Kumar,B. H. Jeon, S. Chakrabortty, S. K. Tripathy,& A. Mishra,

Details: Volume 347, Issue 04, January 2024

Abstract: The emergence of multidrug-resistant (MDR) bacteria has spurred the exploration of therapeutic nanomaterials such as ZnO nanoparticles. However, the inherent nonspecific toxicity of ZnO has posed a significant obstacle to their clinical utilization. In this research, we propose a novel approach to improve the selectivity of the toxicity of ZnO nanoparticles by impregnating them onto a less toxic clay mineral, Bentonite, resulting in ZB nanocomposites (ZB NCs). We hypothesize that these ZB NCs not only reduce toxicity toward both normal and carcinogenic cell lines but also retain the antibacterial properties of pure ZnO nanoparticles. To test this hypothesis, we synthesized ZB NCs by using a precipitation technique and confirmed their structural characteristics through X-ray diffraction and Raman spectroscopy. Electron microscopy revealed composite particles in the size range of 20-50 nm. The BET surface area of ZB NCs, within a relative pressure (P/P_0) range of 0.407-0.985, was estimated to be 31.182 m^2/g. Notably, 50 mg/mL ZB NCs demonstrated biocompatibility with HCT 116 and HEK 293 cell lines, supported by flow cytometry and fluorescence microscopy analysis. In vitro experiments further confirmed a remarkable five-log reduction in the population of MDR Escherichia coli in the presence of 50 mg/mL of ZB NCs. Antibacterial activity of the nanocomposites was also validated in the HEK293 and HCT 116 cell lines. These findings substantiate our hypothesis and underscore the effectiveness of ZB NCs against MDR E. coli while minimizing nonspecific toxicity toward healthy cells.

URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10795042/

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Frontiers in Genetics **IF: 3.7**

Title: Cytokinins: a genetic target for increasing yield potential in the CRISPR era

Author: Mandal, Sayanti; Ghorai, Mimosa; Anand, Uttpal; Roy, Debleena; Kant, Nishi; Mishra, Tulika; Mane, Abhijit Bhagwan; Jha, Niraj Kumar; Lal, Milan Kumar; Tiwari, Rahul Kumar; Kumar, Manoj; Radha; Ghosh, Arabinda; Bhattacharjee, Rahul; Prockow, Jaroslaw; Dey, Abhijit

Details: Volume 15, February 2024

Abstract: Over the last decade, remarkable progress has been made in our understanding the phytohormones, cytokinin's (CKs) biosynthesis, perception, and signalling pathways. Additionally, it became apparent that interfering with any of these steps has a significant effect on all stages of plant growth and development. As a result of their complex regulatory and cross-talk interactions with other hormones and signalling networks, they influence and control a wide range of biological activities, from cellular to organismal levels. In agriculture, CKs are extensively used for yield improvement and management because of their wide-ranging effects on plant growth, development and physiology. One of the primary targets in this regard is cytokinin oxidase/dehydrogenase (CKO/CKX), which is encoded by CKX gene, which catalyses the irreversible degradation of cytokinin. The previous studies on various agronomically important crops indicated that plant breeders have targeted CKX directly. In recent years, prokaryotic clustered regularly interspaced short palindromic repeats (CRISPR)/CRISPR-associated protein 9 (Cas9) system has been increasingly used in editing the CKO/CKX gene and phenomenal results have been achieved. This review provides an updated information on the applications of CRISPR-based gene-editing tools in manipulating cytokinin metabolism at the genetic level for yield improvement. Furthermore, we summarized the current developments of RNP-mediated DNA/transgene-free genomic editing of plants which would broaden the application of this technology. The current review will advance our understanding of cytokinins and their role in sustainably increase crop production through CRISPR/Cas genome editing tool.

URL: https://www.frontiersin.org/journals/genetics/articles/10.3389/fgene.2022.883930/full

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Genetic Engineering and Biotechnology **IF: 3.5**

Title: De novo assembly and comparative genome analysis for polyhydroxyalkanoates-producing Bacillus sp. BNPI-92 strain

Author: S. M. Ebu, L.Ray, A. N. Panda & S. K. Gouda

Details: Volume 21, Issue 01, December 2023

Abstract: Background: Certain Bacillus species play a vital role in polyhydroxyalkanoate (PHA) production. However, most of these isolates did not properly identify to species level when scientifically had been reported. Results: From NGS analysis, 5719 genes were predicted in the de novo genome assembly. Based on genome annotation using RAST server, 5,527,513 bp sequences were predicted with 5679 bp number of protein-coding sequence. Its genome sequence contains 35.1% and 156 GC content and contigs, respectively. In RAST server analysis, subsystem (43%) and non-subsystem coverage (57%) were generated. Ortho Venn comparative genome analysis indicated that Bacillus sp. BNPI-92 shared 2930 gene cluster (core gene) with B. cereus ATCC 14579 ^{T} (AE016877), B. paranthracis Mn5T (MACE01000012), B. thuringiensis ATCC 10792 T (ACNF01000156), and B. antrics Amen T (AE016879) strains. For our strain, the maximum gene cluster (190) was shared with B. cereus ATCC 14579 ^{T} (AE016877). For Ortho Venn pair wise analysis, the maximum overlapping gene clusters thresholds have been detected between Bacillus s p.BNPI-92 and Ba. cereus ATCC 14579 ^{T} (5414). Average nucleotide identity (ANI) such as OriginalANI and OrthoANI, in silicon digital DND-DNA hybridization (isDDH), Type (Strain) Genome Server (TYGS), and Genome-Genome Distance Calculator (GGDC) were more essentially related Bacillus sp. BNPI-92 with B. cereus ATCC 14579 ^{T} strain. Therefore, based on the combination of RAST annotation, OrthoVenn server, ANI and isDDH result Bacillus sp.BNPI-92 strain was strongly confirmed to be a B. cereus type strain. It was designated as B. cereus BNPI-92 strain. In B. cereus BNPI-92 strain whole genome sequence, PHA biosynthesis encoding genes such as phaP, phaQ, phaR (PHA synthesis repressor phaR gene sequence), phaB/phbB, and phaC were predicted on the same operon. These gene clusters were designated as phaPQRBC. However, phaA was located on other operons. Conclusions: This newly obtained isolate was found to be new a strain based on comparative genomic analysis and it was also observed as a potential candidate for PHA biosynthesis.

URL: https://www.sciencedirect.com/science/article/pii/S1687157X23009903?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

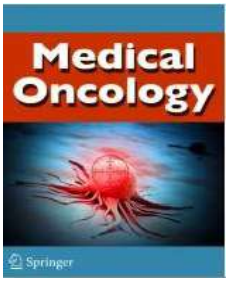
Journal Name: Medical Oncology **IF: 3.4**

Title: Combination of Resveratrol and PARP inhibitor Olaparib efficiently deregulates homologous recombination repair pathway in breast cancer cells through inhibition of TIP60-mediated chromatin relaxation

Author: S. Sinha, S Paul, S. S. Acharya , C. Das , S. R. Dash , S. Bhal, R. Pradhan , B. Das & C.N. Kundu

Details: Volume 41, Issue 02, January 2024

Abstract: Recently, we reported that a combination of a natural, bioactive compound Resveratrol (RES) and a PARP inhibitor Olaparib (OLA) deregulated the homologous recombination (HR) pathway, and enhanced apoptosis in BRCA1-wild-type, HR-proficient breast cancer cells. Upon DNA damage, chromatin relaxation takes place, which allows the DNA repair proteins to access the DNA lesion. But whether chromatin remodeling has any role in RES + OLA-mediated HR inhibition is not known. By using in vitro and ex vivo model systems of breast cancer, we have investigated whether RES + OLA inhibits chromatin relaxation and thereby blocks the HR pathway. It was found that RES + OLA inhibited PARP1 activity, terminated PARP1-BRCA1 interaction, and deregulated the HR pathway only in the chromatin fraction of MCF-7 cells. DR-GFP reporter plasmid-based HR assay demonstrated marked reduction in HR efficiency in I-SceI endonuclease-transfected cells treated with OLA. RES + OLA efficiently trapped PARP1 at the DNA damage site in the chromatin of MCF-7 cells. Unaltered expressions of HR proteins were found in the chromatin of PARP1-silenced MCF-7 cells, which confirmed that RES + OLA-mediated DNA damage response was PARP1-dependent. Histone Acetyltransferase (HAT) activity and histone H4 acetylation assays showed reduction in HAT activity and H4 acetylation in RES + OLA-treated chromatin fraction of cells. Western blot analysis showed that the HAT enzyme TIP60, P400 and acetylated H4 were downregulated after RES + OLA exposure. In the co-immunoprecipitation assay, it was observed that RES + OLA caused abolition of PARP1-TIP60-BRCA1 interaction, which suggested the PARP1-dependent TIP60-BRCA1 association. Unaltered expressions of PAR, BRCA1, P400, and acetylated H4 in the chromatin of TIP60-silenced MCF-7 cells further confirmed the role of TIP60 in PARP1-mediated HR activation in the chromatin. Similar results were obtained in ex vivo patient-derived primary breast cancer cells. Thus, the present study revealed that RES + OLA treatment inhibited PARP1 activity in the chromatin, and blocked TIP60-mediated chromatin relaxation, which, in turn, affected PARP1-dependent TIP60-BRCA1 association, resulting in deregulation of HR pathway in breast cancer cells.



URL: https://link.springer.com/article/10.1007/s12032-023-02279-0

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Digestive Diseases and Science **IF: 3.1**

Title: SOX4/HDAC2 Axis Enhances Cell Survivability and Reduces Apoptosis by Activating AKT/MAPK Signaling in Colorectal Cancer

Author: Anupriya S., A. Chakraborty & Patnaik S.

Details: January 2024

Abstract: Background: Increased SOX4 (SRY-related HMG-box) activity aids cellular transformation and metastasis. However, its specific functions and downstream targets remain to be completely elusive in colorectal cancer (CRC). Aims: To investigate the role of SOX4 in CRC progression and the underlying mechanism. Methods: In the current study, online available datasets of CRC patients were explored to check the expression status of SOX4. To investigate the further functions, SOX4 was overexpressed and knocked down in CRC cells. Colony formation assay, flowcytometry analysis, and MTT assay were used to check for proliferation and apoptosis. Acridine orange staining was done to check the role of SOX4 in autophagy induction. Furthermore, western blot, qRT-PCR, and bioinformatic analysis was done to elucidate the downstream molecular mechanism of SOX4. Results: GEPIA database showed enhanced expression of SOX4 mRNA in CRC tumor, and the human protein atlas (HPA) showed strong staining of SOX4 protein in tumor when compared to the normal tissue. Ectopic expression of SOX4 enhanced colony formation ability as well as rescued cells from apoptosis. SOX4 overexpressed cells showed the formation of acidic vesicular organelles (AVOs) which indicated autophagy. Further results revealed the activation of p-AKT/MAPK molecules upon overexpression of SOX4. SOX4 expression was found to be positively correlated with histone deacetylase 2 (HDAC2). Knockdown of SOX4 or HDAC2 inhibition induced apoptosis, revealed by decrease in BCL2 and increase in BAX expression, and inactivated the p-AKT/MAPK signaling. Conclusion: The study uncovers that SOX4/HDAC2 axis improves cell survivability and reduces apoptosis via activation of the p-AKT/MAPK pathway.

URL: https://link.springer.com/article/10.1007/s10620-023-08215-6

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

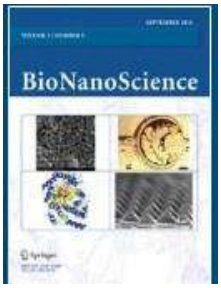
Journal Name: BioNanoScience **IF: 3.0**

Title: Extraction and Characterizations of Viral Protein Particles: A Methodological Study

Author: M. Manoswini., M. Mohanty , A. G. Majumdar , B. R. Sahu & Mohanty P.S.

Details: January 2024

Abstract: Phage (viral) tailspike proteins (TSP) are used in many translation applications such as in pathogenic bacteria detection and therapeutics. Especially, bacterial virus (or bacteriophage) P22 TSP is one of the most popular viral proteins in molecular virology and is very well-studied in terms of structure, interactions with O-antigen (a component of bacterial cell wall), and various aspects of its functions using X-ray crystallography and in vitro and in vivo studies. Although there are many papers on the virological and structural aspects of this protein, basic lab-based methodological studies and its solution-based characterizations using an in-house affordable experimental method which can be easily followed in a laboratory at an undergraduate or graduate level are missing in the literature. Our idea here is to provide a detailed method for preparing P22 TSP in a laboratory environment and studying its basic characterizations in the solution state using the available methods in our laboratory. These methods include SDS-PAGE and Native-PAGE for molecular weight determination, as well as specificity and affinity testing against its host bacterium. Our studies using SDS-PAGE show a band for TSP in the monomeric state at around 72 kDa, and the Native-PAGE proves the trimeric state with a size of around 250 kDa, thereby confirming the information regarding molar mass. On the other side, UV-Vis spectroscopy verifies absorption properties that lie around 250–300 nm. Furthermore, the solution structures of proteins in the native state, determined using dynamic light scattering (DLS), exhibit various size distributions around 10 nm, 100 nm, and 1000 nm, indicating the coexistence of trimeric and multimeric states, along with a small number of aggregates. Finally, the affinity of the TSP with the O-antigen of the host bacterium has been confirmed through western blotting studies, and the results are discussed in the context of the role of different intermolecular interactions involved in the binding of the TSP and the O-antigen group using molecular docking approach. We strongly believe our basic studies will be very helpful for beginners and graduate students in the related field.



URL: https://link.springer.com/article/10.1007/s12668-023-01289-6

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

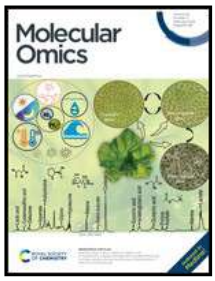
Journal Name: Molecular Omics **IF: 2.9**

Title: Long-term physical inactivity induces significant changes in biochemical pathways related to metabolism of proteins and glycerophospholipids in mice

Author: Sahu, Bijayashree; Pani, Sunil; Swalsingh, Gourabamani; Senapati, Unmod; Pani, Punyadhara; Pati, Benudhara; Rout, Subhasmita; Trivedi, Rimjhim; Raj, Ritu; Dey, Suchanda; Jeet, Amar; Kumar, Dinesh; Bal, Naresh C.

Details: Volume 20, Issue 1, 2024, Pages 64-77

Abstract: Physical inactivity affects multiple organ systems, including the musculoskeletal system, which upsets the delicate balance of several secretory factors leading to metabolic derailment. This reduces contractile recruitment of the skeletal muscle with dampening of its oxidative capacity resulting in impaired intramuscular lipid metabolism and substrate utilization. We hypothesized that this altered phenotype would also have an indispensable effect on circulatory cytokines and the level of metabolic intermediates. In this study, comparison between sedentary (SED) and exercised (EXER) animal models showed that organismal metabolic parameters (body mass, oxygen utilization and glucose tolerance) are altered based on physical activity. Our data suggest that cytokines linked to glycemic excursions (insulin, c-peptide, glucagon) and their passive regulators (leptin, BDNF, active ghrelin, and GIP) exhibit changes in the SED group. Furthermore, some of the proinflammatory cytokines and myokines were upregulated in SED. Interestingly, serum metabolite analysis showed that the levels of glucogenic amino acids (alanine, glycine, tryptophan, proline and valine), nitrogenous amino acids (ornithine, asparagine, and glutamine) and myogenic metabolites (taurine, creatine) were altered due to the level of physical activity. A pyrimidine nucleoside (uridine), lipid metabolite (glycerol) and ketone bodies (acetoacetate and acetate) were found to be altered in SED. A Spearman rank correlation study between SED and CTRL showed that cytokines build a deformed network with metabolites in SED, indicating significant modifications in amino acids, phosphatidylinositol phosphate and glycerophospholipid metabolic pathways. Overall, long-term physical inactivity reorganizes the profile of proinflammatory cytokines, glucose sensing hormones, and protein and glycerophospholipid metabolism, which might be the initial factors of metabolic diseases due to SED.



URL: https://pubs.rsc.org/en/content/articlelanding/2024/mo/d3mo00127j

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

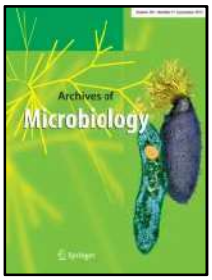
Journal Name: Archives of Microbiology **IF: 2.8**

Title: Combating Staphylococcus aureus biofilm formation: the inhibitory potential of tormentic acid and 23-hydroxycorosolic acid

Author: Ghosh, Chinmoy; Das, Manash C.; Acharjee, Shukdeb; Bhattacharjee, Samadrita; Sandhu, Padmani; Kumari, Monika; Bhowmik, Joyanta; Ghosh, Ranjit; Banerjee, Birendranath; De, Utpal Chandra; Akhter, Yusuf; Bhattacharjee, Surajit

Details: Volume 206, Issue 1,Article No 25, January 2024

Abstract: Plant extracts have been used to treat microbiological diseases for centuries. This study examined plant triterpenoids tormentic acid (TA) and 23-hydroxycorosolic acid (HCA) for their antibiofilm effects on Staphylococcus aureus strains (MTCC-96 and MTCC-7405). Biofilms are bacterial colonies bound by a matrix of polysaccharides, proteins, and DNA, primarily impacting healthcare. As a result, ongoing research is being conducted worldwide to control and prevent biofilm formation. Our research showed that TA and HCA inhibit S. aureus planktonic growth by depolarizing the bacterial membrane. In addition, zone of inhibition studies confirmed their effectiveness, and crystal violet staining and biofilm protein quantification confirmed their ability to prevent biofilm formation. TA and HCA exhibited substantial reductions in biofilm formation for S. aureus (MTCC-96) by 54.85% and 48.6% and for S. aureus (MTCC-7405) by 47.07% and 56.01%, respectively. Exopolysaccharide levels in S. aureus biofilm reduced significantly by TA (25 mu g/mL) and HCA (20 mu g/mL). Microscopy, bacterial motility, and protease quantification studies revealed their ability to reduce motility and pathogenicity. Furthermore, TA and HCA treatment reduced the mRNA expression of S. aureus virulence genes. In silico analysis depicted a high binding affinity of triterpenoids for biofilm and quorum-sensing associated proteins in S. aureus, with TA having the strongest affinity for TarO (- 7.8 kcal/mol) and HCA for AgrA (- 7.6 kcal/mol). TA and HCA treatment reduced bacterial load in S. aureus-infected peritoneal macrophages and RAW264.7 cells. Our research indicates that TA and HCA can effectively combat S. aureus by inhibiting its growth and suppressing biofilm formation.



URL: https://link.springer.com/article/10.1007/s00203-023-03762-y

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Colloid and Polymer Science **IF: 2.4**

Title: Folic acid-conjugated magnetic-luminescent nanocomposites from Mn0.8Fe2.2O4 and GdVO4:Dy3+ with efficient heat generation and cytocompatibility in MDA-231 cell lines

Author: Yengkhom, Dhanapriya Devi; Ningombam, Goutam Singh; Heisnam, Rameshwari; Sharma, Nanaocha; Chipem, Francis A. S.; Singh, Nongmaithem Rajmuhon

Details: Volume 302, Issue 2, February 2024, Pages 277-288

Abstract: Silica-coated magnetic-luminescent nanocomposites, obtained from Mn0.8Fe2.2O4 and near-white emitting GdVO4:Dy3+, reported in this work for possible application in combined imaging and magnetic fluid hyperthermia. Folic acid functionalization of the nanocomposite was further achieved for enhanced tumor affinity since folate receptors are overexpressed in cancer tissues. The nanocomposite showed the cubic-tetragonal biphasic structure corresponding to the cubic Fe3O4 and tetragonal GdVO4 phases. The compositions and surface modifications were confirmed by infrared spectroscopy. The formation of agglomerated nanoparticle was observed from the transmission electron microscopy comprising of particles in the 20-nm size range. Brilliant near white emission can be seen from the nanocomposites upon excitation at 287 nm. The induction heating analysis was performed at the alternating magnetic field strengths of 2.15 x 10(6) kAm(-1) s(-1), 3.05 x 10(6) kAm(-1) s(-1), and 4.58 x 10(6) kAm(-1) s(-1). The MTT assay revealed that the nanocomposite exhibits 50% cell viability towards MDA-231 breast cancer cell line. Thus, these magnetic-luminescent nanocomposites will have potential applications for magnetic fluid hyperthermia and optical imaging.

URL: https://link.springer.com/article/10.1007/s00396-023-05197-9

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Health Science Reports **IF: 2.0**

Title: Global health concern on the rising dengue and chikungunya cases in the American regions: Countermeasures and preparedness

Author: R. K. Mohapatra , P. Bhattacharjee , D. N. Desai, V. Kandi , A. K. Sarangi , S. Mishra, R. Sah ., A.A.A.L Ibrahim., A.A. Rabaan, & K.E. Zahan

Details: Volume 7, Issue 01, January 2024

Abstract: Background and Aim: Severe morbidity and mortality due to seasonal infectious diseases are common global public health issues. Vector-borne viral illnesses like dengue and chikungunya overload the healthcare systems leading to critical financial burden to manage them. There is no effective drug or vaccine currently available to control these two diseases. Methods: The review was formulated by incorporating relevant reports on chikungunya and dengue in the Americas regions through a comprehensive search of literature that were available on dedicated scientific publication portals such as PubMed, ScienceDirect, and Web of Science. Results: The strategies of public health administrations to control largely the mosquito vectors during tropical monsoon seem to be effective. Yet, it seems practically impossible to completely eliminate them. The mosquito vector disseminates the virus via transovarian route thereby internalising the virus through generations, a reason behind reappearing and recurring outbreaks. The numerous factors associated with industrialisation, urbanisation, population density, and easy transboundary movements appear to have contributed to the spread of vectors from an endemic region to elsewhere. Conclusion: The article made a state-of-affair comprehensive analysis of the rising dengue and chikungunya cases in the tropics, particularly the tropical Americas, as a human health concern, the countermeasures undertaken and the overall preparedness. The viral transmission is a hard situation to tackle as the vector survives in diverse temperature and ecology, is resistant to insecticides, and the unavailability of drugs. Better vector-control measures and improved understanding of the reemerging arboviral infections could offer an extended reaction time to counter outbreaks, and minimise associated morbidity/mortality.

URL: https://onlinelibrary.wiley.com/doi/10.1002/hsr2.1831

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Rubber Research **IF: 1.3**

Title: The overall performance of graphene oxide-reinforced epichlorohydrin rubber nanocomposites

Author: Kar, Dilip Kumar; Dutta, Upala; Kumar, Suyash; Mishra, Smrutirekha; Panigrahi, Harekrishna

Details: January 2024

Abstract: In this work, the nanocomposites based on epichlorohydrin rubber (ECO) and graphene oxide (GO) have been prepared by solvent blending followed by open mill mixing, which is known to be an effective way of dispersing nanofillers within a polymer matrix. The successful dispersion of GO sheets within the ECO matrix has been confirmed by high-resolution transmission electron microscopy and atomic force microscopy. The incorporation of 1.5 vol.% of GO sheets into the ECO matrix enhances the breaking stress and stress at 200% strain values of ECO by 67% and 139%, respectively, which is due to the strong interfacial interactions between the polar groups in ECO and the oxygen-containing functional groups on the surfaces of GO sheets. This general finding is further corroborated by the fact that ECO's glass transition temperature increased from - 18 to - 14 degrees C with a 1.5 vol% GO content. The initial degradation temperature, the maximum degradation temperature and the percentage residue of ECO consistently increase with the concentration of GO due to the enhanced interfacial interaction between ECO and GO through chemical bonding, which delays the initial degradation by hampering the process of degradation. The uniform dispersion of GO sheets within the ECO matrix, along with improved interactions between GO sheets and ECO, results in the formation of a densely interconnected network of GO layers within the ECO chains. Consequently, this enhances the oil and fuel resistance of the ECO-GO nanocomposites. The fascinating results and outcomes of this investigation will pave the way for the development of fuel and oil-resistant materials with improved physico-mechanical properties.

URL: https://link.springer.com/article/10.1007/s42464-023-00234-2

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: International Journal of Tropical Insect Science **IF: 1.2**

Title: Entomo-molecular surveillance of Aedes breeding sites reveals discarded tyres as the key breeding sites during the intermittent periods of arboviral outbreaks, Eastern India

Author: Samal, Sagnika; Satapathy, Chinmayee; Pati, Sanghamitra; Das, Biswadeep

Details: Volume 44,Issue 1, January 2024, Pages 401-404

Abstract: Aedes vectors have rapidly spread to regions without any history of arboviral outbreaks in recent time through various modes and due to their ability to rear in manmade containers. Because Aedes immature species can consistently grow in small-domesticated breeding spots, it is important to perform surveillance during the intermittent periods of outbreaks for vector control and management. Detailed entomo-molecular surveillance was carried during the intermittent periods of dengue affected areas of Odisha State of Eastern India from 2021-2022. Indoor and outdoor breeding sites of the Aedes vector were investigated and water containing immature stages were collected, followed by Aedes species assessment using morphological tools along with allele specific PCR using 18S-rRNA region. Aedes albopictus was found to be the main vector through morpho-molecular investigations. Discarded tyres (58%) were the preferred breeding spots, exhibiting significantly high fecundity ($p < 0.05$, ANOVA test) among all breeding sites. Therefore, monitoring and targeting the intermittent breeding spots will assist in vector control management.

URL: https://link.springer.com/article/10.1007/s42690-024-01171-2