SCHOLARLY PUBLICATIONS
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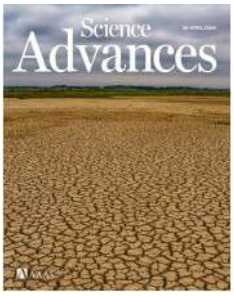
Journal Name: Science Advances **IF: 13.6**

Title: CKLF instigates a “cold” microenvironment to promote MYCN-mediated tumor aggressiveness

Author: Qin X., Lam A., Zhang X., Sengupta S., Iorgulescu J.B., Ni H., Das S., Rager M., Zhou Z., Zuo T., Meara G.K., Floru A.E., Kemet C., Veerapaneni D., Kashy D., Lin L., Lloyd K., Kwok L., Smith K.S., Nagaraju R.T., Meijers R., Ceol C., Liu C.-T., Alexandrescu S., Wu C.J., Keskin D.B., George R.E., Feng H.

Details: Volume 10, Issue 11, March 2024

Abstract: Solid tumors, especially those with aberrant MYCN activation, often harbor an immunosuppressive microenvironment to fuel malignant growth and trigger treatment resistance. Despite this knowledge, there are no effective strategies to tackle this problem. We found that chemokine-like factor (CKLF) is highly expressed by various solid tumor cells and transcriptionally up-regulated by MYCN. Using the MYCN-driven high-risk neuroblastoma as a model system, we demonstrated that as early as the premalignant stage, tumor cells secrete CKLF to attract CCR4-expressing CD4+ cells, inducing immunosuppression and tumor aggression. Genetic depletion of CD4+ T regulatory cells abolishes the immunorestrictive and protumorigenic effects of CKLF. Our work supports that disrupting CKLF-mediated cross-talk between tumor and CD4+ suppressor cells represents a promising immunotherapeutic approach to battling MYCN-driven tumors.



URL: https://www.science.org/doi/10.1126/sciadv.adh9547

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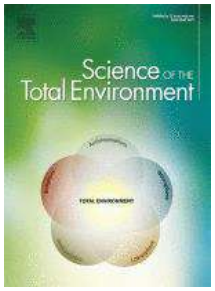
Journal Name: Science of the Total Environment **IF: 9.8**

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
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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
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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
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Journal Name: International Journal of Biological Macromolecules **IF: 8.2**

Title: Modulation of calcium-influx by carboxymethyl tamarind-gold nanoparticles promotes biomineralization for tissue regeneration

Author: Singh A., Kumar S., Acharya T.K., Kumar S., Chawla S., Goswami C., Goswami L.

Details: Volume 264, Part 2, April 2024, 130605

Abstract: Gold nanoparticles (AuNPs) have been reported to modulate bone tissue regeneration and are being extensively utilized in biomedical implementations attributable to their low cytotoxicity, biocompatibility and simplicity of functionalization. Lately, biologically synthesized nanoparticles have acquired popularity because of their environmentally acceptable alternatives for diverse applications. Here we report the green synthesis of AuNPs by taking the biopolymer Carboxymethyl Tamarind (CMT) as a unique reducing as well as a stabilizing agent. The synthesized CMT-AuNPs were analyzed by UV–vis spectrophotometer, DLS, FTIR, XRD, TGA, SEM and TEM. These results suggest that CMT-AuNPs possess an average size of 19.93 ± 8.52 nm and have long-term stability. Further, these CMT-AuNPs promote the proliferation together with the differentiation and mineralization of osteoblast cells in a “dose-dependent” manner. Additionally, CMT-AuNPs are non-toxic to SD rats when applied externally. We suggest that the CMT-AuNPs have the potential to be a suitable and non-toxic agent for differentiation and mineralization of osteoblast cells *in vitro* and this can be tested *in vivo* as well.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0141813024014089?via%3Dihub

SCHOLARLY PUBLICATIONS
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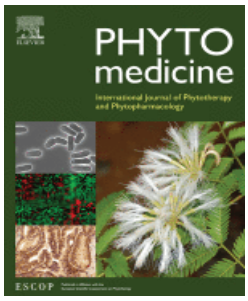
Journal Name: Phytomedicine **IF: 7.9**

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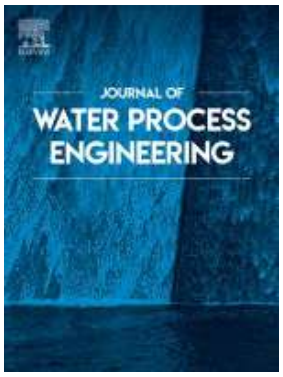
Journal Name: Journal of Water Process Engineering **IF: 7.0**

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
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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
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Journal Name: Journal of Industrial and Engineering Chemistry **IF: 6.1**

Title: Bio-fabrication of ZnONPs using Mimosa pudica Extract to Combat Multidrug Resistant Uropathogens

Author: Pany S., Prasad Sahu R., Ranjit M., Pati S., Suar M., Keshari Samal S.

Details: February 2024

Abstract: Zinc oxide nanoparticles (ZnONPs) have been extensively used in therapeutic applications due to their unique physicochemical and biological properties. Meanwhile, urinary tract infection (UTI) is one of the most prevalent infections for which conventional antibiotics are the only treatment option. Unfortunately, improper and overuse of those antibiotics cause antibiotic resistance. Therefore, the current study is about the eco-friendly and cost-effective green synthesis of ZnONPs using *Mimosa pudica* leaf extract as a reducing, stabilizing, and capping agent that can act as an alternative therapeutics. The structural and optical properties of these *M. pudica*-based ZnONPs(Mp-ZnONPs), were characterized through various techniques, including UV–Vis spectroscopy, dynamic light scattering (DLS), zeta potential analysis, X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), and Field Emission Scanning Electron Microscopy (FESEM). From the above characterization, it was demonstrated that these crystalline nearly spherical NPs had an average size of 22.84 nm and a surface charge of −24.6 mV. Furthermore, the antibacterial and antibiofilm activity of MP-ZnONPs was assessed against multidrug-resistant (MDR) uropathogens, including both Gram-negative *Escherichia coli* (*E. coli*) and Gram-positive *Staphylococcus aureus* (*S. aureus*) strains with a MIC of 25–400 µg. These NPs also exhibited good hemocompatibility against human blood (hblood) samples. The cytotoxicity assay, reactive oxygen species (ROS) production, and NPs involvement in morphological and intracellular function were also investigated in RAW 264.7 and MCF7 cell lines to understand the *in-vitro* biocompatibility. These Mp-ZnONPs also showed an anticancer efficiency for cancerous MCF7 cells in comparison with the standard RAW 264.7 cells.

URL: https://www.sciencedirect.com/science/article/abs/pii/S1226086X2400090X?via%3Dihub

SCHOLARLY PUBLICATIONS
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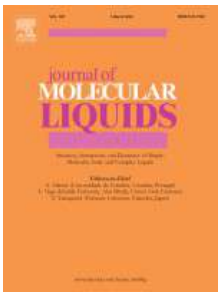
Journal Name: **Journal of Molecular Liquids** **IF: 6**

Title: Inhibition of amyloidal aggregation of insulin by amino acid conjugated bile acids: An insight into the possible role of biosurfactants in modulating the fibrillation kinetics and cytotoxicity

Author: Mohapatra, Saswati Soumya; Bisht, Krishna Singh; Dhar, Suchismita; Biswas, Viplov Kumar; Raghav, Sunil Kumar; Maiti, Tushar Kanti; Biswas, Ashis

Details: Volume 397, March 2024, 124142

Abstract: Insulin-induced amyloidosis, a typical example of protein fibrillation, reduces the effectiveness of insulin treatment in type-II diabetic patients, which demands intense investigations to mitigate insulin fibrillation. Herein, the inhibitory effect of two taurine conjugated bile acids [taurocholic acid (TCA) and taurodeoxycholic acid (TDCA)] towards insulin fibrillation has been elucidated using various biophysical, imaging and computational tools. TCA delays lag time of fibrillation while TDCA targets fibril elongation step and thus impeding insulin primary fibrillation. TDCA also inhibits the secondary fibrillation of insulin efficiently. The greater inhibition of both fibrillation processes is evidenced once insulin is kept with TDCA under fibrillogenic conditions. *In silico* studies reveal that these two bile acids interact with several aggregation-prone residues (e.g. Tyr16, Phe24, Tyr26) present at the C-terminal portion of insulin B-chain. Such interactions stabilize the native insulin structure, reduce the surface hydrophobicity and aggregate size as well as modulate the fibril morphology. Both these molecules are non-toxic and attenuate insulin fibril-induced hemolysis of erythrocytes and cytotoxicity in HepG2 cells. Overall, our findings provide novel insights to the study of amyloidal protein fibrillation and lay foundation towards the utilization of these two taurine conjugated bile acids as inhibitors of insulin fibrillation and insulin-induced amyloidosis.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0167732224001971?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Medical Oncology **IF: 5.8**

Title: Estrogen-related receptor alpha (ERRα) promotes the migration, invasion and angiogenesis of breast cancer stem cell-like cells

Author: Muduli K., Pradhan J., Prusty M., Samal A.P., Reddy K.S., Elangovan S.

Details: Volume 41, Article number 78, February 2024

Abstract: Breast cancer progression, metastasis and recurrence are largely driven by breast cancer stem cells (BCSCs), which constitute a subset of tumor cells exhibiting stem cell characteristics. In this study, we evaluated the role of estrogen-related receptor alpha (ERRα) in the migration, invasion and angiogenesis of BCSCs. The inhibition of ERRα using XCT790 or knockdown of ERRα using shRNA inhibited the mammosphere formation efficiency, as well as the migration and invasion of BCSCs derived from the mammospheres of MCF7 and MDA-MB-231 (MB231) cells. Conversely, the overexpression of ERRα significantly increased the migration and invasion of BCSCs derived from the mammosphere. In addition, the XCT790 treatment or shERRα significantly downregulated the epithelial-mesenchymal transition (EMT), as evidenced by the downregulation in the expression of vimentin, Snail, Slug and N-cadherin in the mammospheres of MCF7 and MB231 cells. The chorioallantoic membrane assay showed that the conditioned media from XCT790-treated and shERRα cells significantly inhibited blood vessel formation and vessel length. Furthermore, XCT790 treatment or shERRα also downregulated the expression of molecular markers of angiogenesis, such as VEGF-A and Ang-2 in the mammospheres. Conversely, the overexpression of ERRα in MCF7 cells significantly increased both EMT and angiogenesis. These findings suggest that ERRα inhibits the migration, invasion and angiogenesis of BCSCs, suggesting as a potential target for breast cancer therapy.

URL: https://link.springer.com/article/10.1007/s12032-024-02329-1

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: ACS Biomaterials Science & Engineering **IF: 5.7**

Title: TRPV4 Activator-Containing CMT-Hy Hydrogel Enhances Bone Tissue Regeneration In Vivo by Enhancing Mitochondrial Health

Author: Kumar, Satish; Acharya, Tusar K.; Kumar, Shamit; Rokade, Tejas P.; Das, Nilesh K.; Chawla, Saurabh; Goswami, Luna; Goswami, Chandan

Details: Volume 10, Issue 4, March 2024

Abstract: Treating different types of bone defects is difficult, complicated, time-consuming, and expensive. Here, we demonstrate that transient receptor potential cation channel subfamily V member 4 (TRPV4), a mechanosensitive, thermogated, and nonselective cation channel, is endogenously present in the mesenchymal stem cells (MSCs). TRPV4 regulates both cytosolic Ca^{2+} levels and mitochondrial health. Accordingly, the hydrogel made from a natural modified biopolymer carboxymethyl tamarind CMT-Hy and encapsulated with TRPV4-modulatory agents affects different parameters of MSCs, such as cell morphology, focal adhesion points, intracellular Ca^{2+}, and reactive oxygen species- and NO-levels. TRPV4 also regulates cell differentiation and biomineralization in vitro. We demonstrate that 4α-10-CMT-Hy and 4α-50-CMT-Hy (the hydrogel encapsulated with 4αPDD, 10 and 50 nM, TRPV4 activator) surfaces upregulate mitochondrial health, i.e., an increase in ATP- and cardiolipin-levels, and improve the mitochondrial membrane potential. The same scaffold turned out to be nontoxic in vivo. 4α-50-CMT-Hy enhances the repair of the bone-drill hole in rat femur, both qualitatively and quantitatively in vivo. We conclude that 4α-50-CMT-Hy as a scaffold is suitable for treating large-scale bone defects at low cost and can be tested for clinical trials.

URL: https://pubs.acs.org/doi/10.1021/acsbiomaterials.3c01304

SCHOLARLY PUBLICATIONS
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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
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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

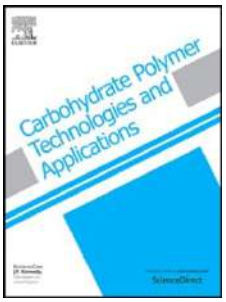
Journal Name: Carbohydrate Polymer Technologies and Applications **IF: 5.5**

Title: Silver nanoparticles in electrospun ethyl hydroxy ethyl cellulose-PVA Nanofiber: Synthesis, characterization and wound dressing applications

Author: Wali A., Gorain M., Kundu G., Badiger M.

Details: Volume 7, June 2024, 100477

Abstract: Electrospinning is a simple, cost-effective technique and a reproducible process for both synthetic and natural polymers. It is found to be an attractive tool for various applications in biomedical engineering, filtration, protective clothing, catalysis reactions and sensors. Non-ionic cellulose ethers namely Ethyl Hydroxy Ethyl Cellulose (EHEC) is an important polysaccharide which is non-toxic, biocompatible and biodegradable and finds applications as thickening/rheology control agents in paints, cosmetics, detergents, oil recovery and also in the biomedical area. Poly (vinyl alcohol) (PVA) is a semi-crystalline hydrophilic polymer which is highly biocompatible and non-toxic having good thermal and mechanical properties and also high water solubility. Silver shows powerful antimicrobial activity and is non-toxic. It has been used to cure severe burns and chronic ulcers for many decades and is extensively used as an additive in various fields like prostheses, burn treatment, catheters, vascular grafts, dental resin components, ion exchange fibers, stainless steel materials, human skin and coating of medical devices. In the present work, EHEC/PVA nanofibers embedded with silver nanoparticles (AgNPs) are studied for their antibacterial activity using both gram positive and gram negative bacteria. The nanofibers show increase in tensile properties with the addition of silver nano-particles. The AgNPs embedded EHEC/PVA nanofiber mats having 0.5% AgNPs were found to enhance the wound healing with no scar formation in wistar rats. The biological *in-vitro* and *in-vivo* studies support the potential of EHEC based nanofibers as excellent bio-materials for the treatment of severe burns and wounds. To the best of our knowledge, this is the first report on the electrospinning of EHEC/PVA nanofibers for wound healing applications.



URL: https://www.sciencedirect.com/science/article/pii/S2666893924000574?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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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
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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

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
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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
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Journal Name: Frontiers in Microbiology **IF: 5.2**

Title: Genomic insights from Lactiplantibacillus plantarum BRD3A isolated from Atingba, a traditional fermented rice-based beverage and analysis of its potential for probiotic and antimicrobial activity against Methicillin-resistant Staphylococcus aureus

Author: Huidrom, Surmani; Ngashangva, Ng; Khumlianlal, Joshua; Sharma, Kongbrailatpam Chandradev; Mukherjee, Pulok Kumar; Devi, Sarangthem Indira

Details: Volume 15, March 2024

Abstract: Lactiplantibacillus plantarum BRD3A was isolated from Atingba, a traditional fermented rice-based beverage of Manipur. Its genomic sequence has 13 contigs and its genome size is 3,320,817 bp with a guanine–cytosine (GC) ratio of 44.6%. It comprises 3185 genes including 3112 coding sequences (CDSs), 73 RNAs (including 66 tRNAs and others), and one clustered regularly interspaced short palindromic repeat (CRISPR) array. A comparative and phylogenetic analysis with the Lp. plantarum genome shows that this strain has close similarity with other Lp. plantarum strains and about 99% average nucleotide identity. Functional annotation using evolutionary genealogy of genes—non-supervised orthologous groups (EggNOG) and Kyoto Encyclopedia of Genes and Genomes (KEGG) reveals genes associated with various biological processes such as metabolism, genetic information processing, and transport functions. Furthermore, the strain harbors bacteriocins like plantaricin E, Plantaricin F, and Enterocin X categorized under class IIb by the BAGEL4 database, indicating its potential antimicrobial properties. Additionally, AntiSMASH web server predicted four secondary regions—T3PKS, terpene, cyclic lactone inducer, and ribosomally synthesized and post-translationally modified peptide (RiPP)—suggesting an even higher antimicrobial potential. We validated the antimicrobial activity of Lp. plantarum BRD3A through in vitro experiments in which it exhibited promising bactericidal effects on methicillin-resistant Staphylococcus aureus, inhibiting their biofilm growth. These findings indicate the potential of Lp. plantarum BRD3A to be used as an alternative to conventional antibiotics.

URL: https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2024.1357818/full

SCHOLARLY PUBLICATIONS
School of Biotechnology
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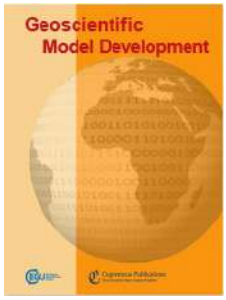
Journal Name: Geoscientific Model Development **IF: 5.1**

Title: Decision Support System version 1.0 (DSS v1.0) for air quality management in Delhi, India

Author: Govardhan, Gaurav; Ghude, Sachin D.; Kumar, Rajesh; Sharma, Sumit; Gunwani, Preeti; Jena, Chinmay; Yadav, Prafull; Ingle, Shubhangi; Debnath, Sreyashi; Pawar, Pooja; Acharja, Prodip; Jat, Rajmal; Kalita, Gayatry; Ambulkar, Rupal; Kulkarni, Santosh; Kaginalkar, Akshara; Soni, Vijay K.; Nanjundiah, Ravi S.; Rajeevan, Madhavan

Details: Volume 17, Issue 7, April 2024

Abstract: This paper discusses the newly developed Decision Support System version 1.0 (DSS v1.0) for air quality management activities in Delhi, India. In addition to standard air quality forecasts, DSS provides the contribution of Delhi, its surrounding districts, and stubble-burning fires in the neighboring states of Punjab and Haryana to the PM2.5 load in Delhi. DSS also quantifies the effects of local and neighborhood emission-source-level interventions on the pollution load in Delhi. The DSS-simulated Air Quality Index for the post-monsoon and winter seasons of 2021–2022 shows high accuracy (up to 80 %) and a very low false alarm ratio (⍰ 20 %) from day 1 to day 5 of the forecasts, especially when the ambient air quality index (AQI) is > 300. During the post-monsoon season (winter season), emissions from Delhi, the rest of the National Capital Region (NCR)'s districts, biomass-burning activities, and all other remaining regions on average contribute 34.4 % (33.4 %), 31 % (40.2 %), 7.3 % (0.1 %), and 27.3 % (26.4 %), respectively, to the PM2.5 load in Delhi. During peak pollution events (stubble-burning periods or wintertime), however, the contribution from the main sources (farm fires in Punjab–Haryana or local sources within Delhi) could reach 65 %–69 %. According to DSS, a 20 % (40 %) reduction in anthropogenic emissions across all NCR districts would result in a 12 % (24 %) reduction in PM2.5 in Delhi on a seasonal mean basis. DSS is a critical tool for policymakers because it provides such information daily through a single simulation with a plethora of emission reduction scenarios.



URL: https://gmd.copernicus.org/articles/17/2617/2024/

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

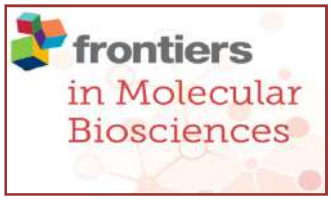
Journal Name: Frontiers in Molecular Biosciences **IF: 5**

Title: An insight into the role of the N-terminal domain of Salmonella CobB in oligomerization and Zn2+ mediated inhibition of the deacetylase activity

Author: Beura, Shibangini; Pritam, Pulak; Dhal, Ajit Kumar; Jana, Arindam; Dash, Aiswarya; Mohanty, Pritisundar; Panda, Alok Kumar; Modak, Rahul

Details: Volume 11, March 2024

Abstract: Prokaryotic deacetylases are classified into nicotinamide adenine dinucleotide (NAD+)-dependent sirtuins and Zn2+-dependent deacetylases. NAD+ is a coenzyme for redox reactions, thus serving as an essential component for energy metabolism. The NAD+-dependent deacetylase domain is quite conserved and well characterized across bacterial species like CobB in *Escherichia coli* and *Salmonella*, Rv1151c in *Mycobacterium*, and SirtN in *Bacillus subtilis*. *E. coli* CobB is the only bacterial deacetylase with a known crystal structure (PDB ID: 1S5P), which has 91% sequence similarity with *Salmonella* CobB (SeCobB). *Salmonella* encodes two CobB isoforms, SeCobBS and SeCobBL, with a difference of 37 amino acids in its N-terminal domain (NTD). The hydrophobic nature of NTD leads to the stable oligomerization of SeCobBL. The homology modeling-based predicted structure of SeCobB showed the presence of a zinc-binding motif of unknown function. Tryptophan fluorescence quenching induced by ZnCl2 showed that Zn2+ has a weak interaction with SeCobBS but higher binding affinity toward SeCobBL, which clearly demonstrated the crucial role of NTD in Zn2+ binding. In the presence of Zn2+, both isoforms had significantly reduced thermal stability, and a greater effect was observed on SeCobBL. Dynamic light scattering (DLS) studies reflected a ninefold increase in the scattering intensity of SeCobBL upon ZnCl2 addition in contrast to an ?onefold change in the case of SeCobBS, indicating that the Zn2+ interaction leads to the formation of large particles of SeCobBL. An *in vitro* lysine deacetylase assay showed that SeCobB deacetylated mammalian histones, which can be inhibited in the presence of 0.25–1.00 mM ZnCl2. Taken together, our data conclusively showed that Zn2+ strongly binds to SeCobBL through the NTD that drastically alters its stability, oligomeric status, and enzymatic activity *in vitro*.



URL: https://www.frontiersin.org/articles/10.3389/fmolb.2024.1345158/full

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

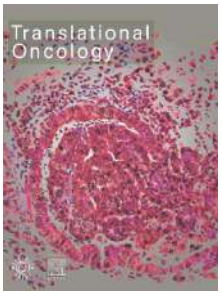
Journal Name: Translational Oncology **IF: 5**

Title: Preclinical evaluation of engineered L-asparaginase variants to improve the treatment of Acute Lymphoblastic Leukemia

Author: Sengupta, Soumika; Biswas, Mainak; Gandhi, Khushboo A.; Gupta, Saurabh Kumar; Gera, Poonam B.; Gota, Vikram; Sonawane, Avinash

Details: Volume 43, May 2024

Abstract: Introduction: Escherichia coli L-asparaginase (EcA), an integral part of multi-agent chemotherapy protocols of acute lymphoblastic leukemia (ALL), is constrained by safety concerns and the development of anti-asparaginase antibodies. Novel variants with better pharmacological properties are desirable. Methods: Thousands of novel EcA variants were constructed using protein engineering approach. After preliminary screening, two mutants, KHY-17 and KHYW-17 were selected for further development. The variants were characterized for asparaginase activity, glutaminase activity, cytotoxicity and antigenicity in vitro. Immunogenicity, pharmacokinetics, safety and efficacy were tested in vivo. Binding of the variants to preexisting antibodies in primary and relapsed ALL patients' samples was evaluated. Results: Both variants showed similar asparaginase activity but approximately 24 -fold reduced glutaminase activity compared to wild -type EcA (WT). Cytotoxicity against Reh cells was significantly higher with the mutants, although not toxic to human PBMCs than WT. The mutants showed approximately 3 -fold lower IgG and IgM production compared to WT. Pharmacokinetic study in BALB/c mice showed longer half-life of the mutants (KHY-17- 267.28 +/- 9.74; KHYW-17- 167.41 +/- 14.4) compared to WT (103.24 +/- 18). Single and repeat-doses showed no toxicity up to 2000 IU/kg and 1600 IU/kg respectively. Efficacy in ALL xenograft mouse model showed 80-90 % reduction of leukemic cells with mutants compared to 40 % with WT. Consequently, survival was 90 % in each mutant group compared to 10 % with WT. KHYW-17 showed over 2 -fold lower binding to preexisting anti-asparaginase antibodies from ALL patients treated with L-asparaginase. Conclusion: EcA variants demonstrated better pharmacological properties compared to WT that makes them good candidates for further development.



URL: https://www.sciencedirect.com/science/article/pii/S1936523324000342?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

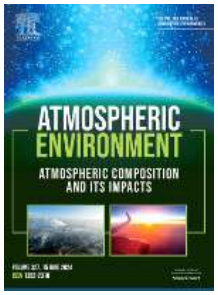
Journal Name: Atmospheric Environment **IF: 5**

Title: Evaluating the sensitivity of fine particulate matter (PM2.5) simulations to chemical mechanism in WRF-Chem over Delhi

Author: Jat, Rajmal; Jena, Chinmay; Yadav, Prafull P.; Govardhan, Gaurav; Kalita, Gayatry; Debnath, Sreyashi; Gunwani, Preeti; Acharja, Prodip; Pawar, Pooja V.; Sharma, Pratul; Kulkarni, Santosh H.; Kulkarni, Akshay; Kaginalkar, Akshara; Chate, Dilip M.; Kumar, Rajesh; Soni, Vijay Kumar; Ghude, Sachin D.

Details: Volume 323, 15 April 2024, 120410

Abstract: Accurate prediction of PM2.5, its optical properties and dominant chemical components are essential for air quality studies. In this study, we investigated the effects of two gas phase chemical schemes coupled with three aerosol mechanisms on the simulated PM2.5 mass concentration in Delhi using the Weather Research and Forecasting model with Chemistry module (WRF-Chem). The model was employed to cover the entire northern region of India at 10 km horizontal spacing and results were compared with comprehensive field data set on dominant PM2.5 chemical compounds from the Winter Fog EXperiment (WiFEX) at the Indira-Gandhi International Airport, New Delhi, and surface PM2.5 observations in Delhi (17 sites), Punjab (3 sites), Haryana (4 sites), Uttar Pradesh (7 sites) and Rajasthan (17 sites). The Model for Ozone and related Chemical Tracers (MOZART) gas-phase chemical mechanism coupled with the Goddard Chemistry Aerosol Radiation and Transport (GOCART) aerosol scheme were selected in the first experiment as it is currently employed in the operational air quality forecasting system of Ministry of Earth Sciences (MoES), Government of India. Other two simulations were performed with the MOZART gas phase chemical mechanism coupled with the Model for Simulating Aerosol Interactions and Chemistry (MOZART-MOSAIC), and Carbon Bond 5 (CB-05) gas mechanism coupled with the Modal Aerosol Dynamics Model for Europe/Secondary Organic Aerosol Model (CB05 - MADE/SORGAM) aerosol mechanisms. The evaluation demonstrated that chemical mechanisms affect the evolution of gas-phase precursors and aerosol processes which in turn affect the optical depth and overall performance of the model for PM2.5. All the three chemical schemes underestimate the observed concentrations of major aerosol composition and precursor gases over Delhi. Comparison with observations suggests that, the simulations using MOZART gas-phase chemical mechanism with MOSAIC aerosol scheme performed better in simulating aerosols over Delhi and its optical depth over the IGP.



URL: https://www.sciencedirect.com/science/article/abs/pii/S1352231024000852?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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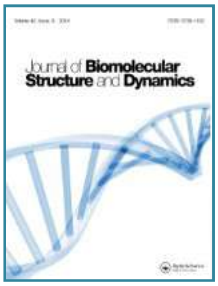
Journal Name: Journal of Biomolecular Structure and Dynamics **IF: 4.4**

Title: Computational and in vitro screening validates the repositioning potential of Coxibs as anti-fibrotic agents

Author: Karande S., Das B., Acharya S.S., Kumar A., Patel H., Sharma A., Gupta M., Ahmad I., Bhandare V., Sharma K., Kundu C.N., Patil C.

Details: March 2024

Abstract: Idiopathic pulmonary fibrosis (IPF) is a life-threatening disease with a survival rate of <5 years. The TGF-β plays a significant role in the progression and severity of IPF. The TGF-β receptor type1 TGFBR1 antagonists inhibit the process of fibrosis and may have a role in the treatment of IPF. The main objective of the study was to identify promising drug candidates against IPF using In-silico and In-vitro evaluation methods. An in-silico screening was carried out of the marketed Coxibs to find their TGFBR1 inhibitory potential considering their structural resemblance with the JZO—a co-crystalized ligand of the crystal structure of the TGFBR1. The virtual screening yielded rofecoxib as a TGFBR1 ligand with a significant docking score. To further validate the outcome of molecular docking studies, MD simulation of 200 ns was carried out followed by the determination of conformational stability, binding free energy calculation using MMPBSA/MMGBSA, and Free Energy Landscape (FEL). The therapeutic efficacy of rofecoxib was compared with that of nintedanib (a therapeutic agent used in the treatment of IPF) at equimolar concentrations (5 µM). The model of TGF-β1 (1 ng/ml)-induced EMT of A549 was used to determine the effect of rofecoxib on the EMT markers like cellular morphology, cytokine expressions, fibrosis associated protein, E-cadherin, and α-smooth muscle actin. In vitro results indicated that rofecoxib significantly suppresses the TGF-β1-induced EMT of A549 cells and validates the possible preventive/protective role of rofecoxib in pulmonary fibrosis. In conclusion, rofecoxib may be considered for repositioning as an anti-fibrotic agent.



URL: https://www.tandfonline.com/doi/full/10.1080/07391102.2024.2318655

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

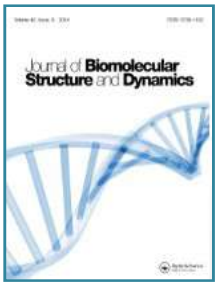
Journal Name: Journal of Biomolecular Structure and Dynamics **IF: 4.4**

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

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

Details: Volume 42, Issue 1, 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.



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

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: Heliyon **IF: 4.4**

Title: Polymerized stimuli-responsive microgel hybrids of silver nanoparticles as efficient reusable catalyst for reduction reaction

Author: Pany, Biswajit; Majumdar, Amrito Ghosh; Bhat, Suresh; Si, Satybrata; Yamanaka, Junpei; Mohanty, Priti S.

Details: Volume 10, Issue 5, March 2024

Abstract: We have showcased the potential of polymerized hydrogels (PGMs) with uniform-sized stimuli-responsive microgel particles as promising alternatives to prevent aggregation in solution based nanoparticle systems. In the current work, we implemented the PGM concept by embedding anionic stimuli-responsive microgels (PNIPAM-co-AAc)-silver (Ag) hybrids within a hydrogel matrix. These PGM@AgNP hybrid materials are used as catalysts for the reduction of 4-nitrophenol (4-NP) to 4-aminophenol (4-AP) in the presence of sodium borohydride. UV-VIS spectroscopy is used for studying catalytic activity. In the solution based system, the complete reduction of 4-NP to 4-AP took 30 minutes with pure Ag nanoparticles, 24 minutes with PNIPAM-Ag hybrid (Neutral) microgels and 15 minutes with PNIPAM-co-AAc-Ag (Anionic) hybrid microgels. In contrast PGM containing PNIPAM-co-AAc-Ag hybrids achieved full reduction in just 15 minutes, along with a 3-minute induction period. For pure Ag nanoparticles, the first-order rate constant is found to be 0.25 min−1, for PNIPAM-Ag hybrid (Neutral), it is 0.21 min−1 and for PNIPAM-co-AAc-Ag (Anionic), it is 0.5 min−1 where as for PGM containing anionic microgel hybrids it is found to be 0.8 min−1. Furthermore, the reusability of the PGM-Ag (anionic) materials for catalytic activity remains unaltered even after several washings. In summary, our study highlights the effectiveness of PGM@AgNP materials as efficient catalysts for the reduction of 4-nitrophenol to 4-aminophenol, indicating their versatile potential in various catalytic applications.

URL: https://www.sciencedirect.com/science/article/pii/S2405844024022758?via%3Dihub

SCHOLARLY PUBLICATIONS
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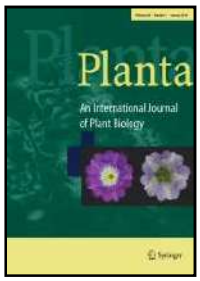
Journal Name: Planta **IF: 4.3**

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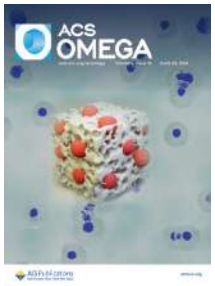
Journal Name: ACS OMEGA **IF: 4.1**

Title: Understanding Matrix Stiffness in Vinyl Polymer Hydrogels: Implications in Bone Tissue Engineering

Author: Panda, Gyanendra Prasad; Barik, Debyashreeta; Dash, Mamoni

Details: Volume 9, Issue 16, March 2024

Abstract: Matrix elasticity helps to direct bone cell differentiation, impact healing processes, and modify extracellular matrix deposition, all of which are required for tissue growth and maintenance. In this work, we evaluated the role of inorganic nanocrystals or mineral inducers such as nanohydroxyapatite, alkaline phosphatase, and nanoclay also known as montmorillonite deposited on vinyl-based hydrogels in generating matrices with different stiffness and their role in cell differentiation. Poly-2-(dimethylamino)ethyl methacrylate (PD) and poly-2-hydroxypropylmethacrylamide (PH) are the two types of vinyl polymers chosen for preparing hydrogels via thermal cross-linking. The hydrogels exhibited porosity, which decreased with an increase in stiffness. Each of the compositions is non-cytotoxic and maintains the viability of pre-osteoblasts (MC3T3-E1) and human bone marrow mesenchymal stem cells (hBMSCs). The PD hydrogels in the presence of ALP showed the highest mineralization ability confirmed through the alizarin assay and a better structural environment for their use as scaffolds for tissue engineering. The study reveals that understanding such interactions can generate hydrogels that can serve as efficient 3D models to study biomineralization.



URL: https://pubs.acs.org/doi/10.1021/acsomega.3c08877

SCHOLARLY PUBLICATIONS
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Journal Name: RSC Medicinal Chemistry **IF: 4.1**

Title: Molecular editing of NSC-666719 enabling discovery of benzodithiazinedioxide-guanidines as anticancer agents

Author: Rao, Vajja Krishna; Paul, Subarno; Gulkis, Mitchell; Shen, Zhihang; Nair, Haritha; Singh, Amandeep; Li, Chenglong; Sharma, Arun K.; Caglayan, Melike; Das, Chinmay; Das, Biswajit; Kundu, Chanakya N.; Narayan, Satya; Guchhait, Sankar K.

Details: Volume 15, Issue 3, January 2024

Abstract: DNA polymerase β (Polβ) is crucial for the base excision repair (BER) pathway of DNA damage repair and is an attractive target for suppressing tumorigenesis as well as chemotherapeutic intervention of cancer. In this study, a unique strategy of scaffold-hopping-based molecular editing of a bioactive agent NSC-666719 was investigated, which led to the development of new molecular motifs with Polβ inhibitory activity. NSC compound and its analogs (two series) were prepared, focusing on pharmacophore-based molecular diversity. Most compounds showed higher activities than the parent NSC-666719 and exhibited effects on apoptosis. The inhibitory activity of Polβ was evaluated in both *in vitro* reconstituted and *in vivo* intact cell systems. Compound 10e demonstrated significant Polβ interaction and inhibition characteristics, including direct, non-covalent, reversible, and comparable binding affinity. The investigated approach is useful, and the discovered novel analogs have a high potential for developing as anticancer therapeutics.

URL: https://pubs.rsc.org/en/content/articlelanding/2024/md/d3md00648d

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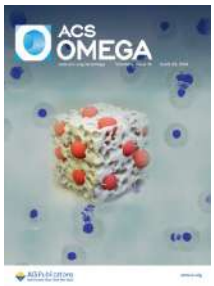
Journal Name: ACS OMEGA **IF: 4.1**

Title: Two-Phase Crude Oil-Water Flow Through Different Pipes: An Experimental Investigation Coupled with Computational Fluid Dynamics Approach

Author: Banerjee, Shirsendu; Banik, Anirban; Rajak, Vinay Kumar; Bandyopadhyay, Tarun Kanti; Nayak, Jayato; Jasinski, Michal; Kumar, Ramesh; Jeon, Byong-Hun; Siddiqui, Masoom Raza; Khan, Moonis Ali; Chakrabortty, Sankha; Tripathy, Suraj K.

Details: Volume 9, Issue 10, March 2024

Abstract: The present study deals with two-phase non-Newtonian pseudoplastic crude oil and water flow inside horizontal pipes simulated by ANSYS. The study helps predict velocity and velocity profiles, as well as pressure drop during two-phase crude-oil–water flow, without complex calculations. Computational fluid dynamics (CFD) analysis will be very important in reducing the experimental cost and the effort of data acquisition. Three independent horizontal stainless steel pipes (SS-304) with inner diameters of 1 in., 1.5 in., and 2 in. were used to circulate crude oil with 5, 10, and 15% v/v water for simulation purposes. The entire length of the pipes, along with their surfaces, were insulated to reduce heat loss. A grid size of 221,365 was selected as the optimal grid. Two-phase flow phenomena, pressure drop calculations, shear stress on the walls, along with the rate of shear strain, and phase analysis were studied. Moreover, velocity changes from the wall to the center, causing a velocity gradient and shear strain rate, but at the center, no velocity variation (velocity gradient) was observed between the layers of the fluid. The precision of the simulation was investigated using three error parameters, such as mean square error, Nash-Sutcliffe efficiency, and RMSE-standard deviation of observation ratio. From the simulation, it was found that CFD analysis holds good agreement with experimental results. The uncertainty analysis demonstrated that our CFD model is helpful in predicting the rheological parameters very accurately. The study aids in identifying and predicting fluid flow phenomena inside horizontal straight pipes in a very effective way.



URL: https://pubs.acs.org/doi/10.1021/acsomega.3c05290

SCHOLARLY PUBLICATIONS
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Journal Name: Journal of Plant Biology **IF: 2.9**

Title: Investigating the Phi Use Efficiency of a NADP Utilizing Phosphite Dehydrogenase in Rice

Author: Datta D., Manna M., Parmar H., Karippadakam S., Rashid A., Mehta S., Lal S.K., Venkatapuram A.K., Singh J., Reddy M.K., Patnaik S., Achary V.M.M.

Details: April 2024

Abstract: Phosphite, a reduced form of phosphate, has been proposed to be a better source of phosphorus due to its high mobility in soil and can be used as an alternative fertilizer with herbicide for growing crops engineered with bacterial phosphite dehydrogenase protein from Pseudomonas stutzeri. This enzyme uses NAD as a cofactor and its overexpression could deplete the cellular NAD pool, creating pressure on other cellular biochemical reactions. To take advantage of both NAD and NADP, we mutated the native phosphite dehydrogenase gene for relaxed cofactor specificity and overexpressed it in rice plants. The engineered rice plants were found to metabolize phosphite efficiently. However, use of phosphite as a herbicide was not met by mutated phosphite dehydrogenase overexpressing plants as compared to the rice plants overexpressing wild type phosphite dehydrogenase. Therefore, we conclude that mutant phosphite dehydrogenase has potential industrial application for NADPH regeneration and its use for engineering crops for dual fertilization and weed control system is limited.

URL: https://link.springer.com/article/10.1007/s12374-024-09423-x

SCHOLARLY PUBLICATIONS
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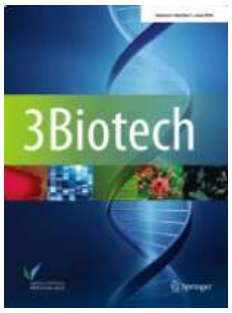
Journal Name: 3 Biotech **IF: 2.8**

Title: Comparative genome-wide analysis of novel Streptomyces isolates RC1831 and RC1832: deciphering the role of functional carbohydrate (CAZy) active genes including chitinase for production of chitosan

Author: Nivedita, Suchismita; Behera, Subhransu Sekhar; Behera, Himadri Tanaya; Gouda, Sudhansu Kumar; Panda, Ananta Narayana; Ray, Lopamudra

Details: Volume 14, Article number 114, March 2024

Abstract: This work compares two bacterial isolates Streptomyces barkulensis RC1831 and Streptomyces chitinovorans RC1832 isolated from Chilika Lake sediments in Odisha, India, using whole-genome sequence analysis. According to the results of the genome analysis, the RC1831 genome has a chromosome with 6,383,258 bp (72.9% GC) and 6145 coding sequences and 66 RNA, while the RC1832 genome has a chromosome with 6,055,792 bp (73.1% GC) and 5824 coding sequences and 63 RNA. Further analysis of the carbohydrate active enzyme (CAZyme) revealed that RC1831 contains 78 glycoside hydrolase family genes, whereas RC1832 includes 50 glycoside hydrolases that have the potential to regulate the chitin-degrading enzymes. KAAS (KEGG Automatic Annotation Server) and AntiSMASH online tool V3.0.5 were used to identify a biosynthetic gene cluster in the isolated strain's genome. The detailed comparative analysis of the genes between the strains will help to gain better insight of chitin and other carbohydrate polymer degradation and secondary metabolite production in both the strains as well as the evolutionary relationship and possibilities of industrial application of these strains. Chitosan production might be explained by genes for the chitin breakdown pathway found in the genome sequence, but genes for later-stage conversion were not found. One significant biomolecule with a wide range of industrial uses is chitosan. Therefore, using these microbes to produce chitosan offers a viable waste disposal solution.



URL: https://link.springer.com/article/10.1007/s13205-024-03936-5

Journal Name: American Journal of Clinical Oncology-Cancer Clinical Trials **IF: 2.6**

Title: Emerging Futuristic Targeted Therapeutics

Author: Mistry, Tanuma; Nath, Arijit; Pal, Ranita; Ghosh, Sushmita; Mahata, Sutapa; Kumar Sahoo, Pranab; Sarkar, Sinjini; Choudhury, Trisha; Nath, Partha; Alam, Neyaz; Nasare, Vilas D.

Details: Volume 47, Issue 3, Page 132-148, March 2024

Abstract: Triple-negative breast cancer is characterized by high lethality attributed to factors such as chemoresistance, transcriptomic, and genomic heterogeneity, leading to a poor prognosis and limiting available targeted treatment options. While the identification of molecular targets remains pivotal for therapy involving chemo drugs, the current challenge lies in the poor response rates, low survival rates, and frequent relapses. Despite various clinical investigations exploring molecular targeted therapies in conjunction with conventional chemo treatment, the outcomes have been less than optimal. The critical need for more effective therapies underscores the urgency to discover potent novel treatments, including molecular and immune targets, as well as emerging strategies. This review provides a comprehensive analysis of conventional treatment approaches and explores emerging molecular and immune-targeted therapeutics, elucidating their mechanisms to address the existing obstacles for a more effective management of triple-negative breast cancer.

URL:https://journals.lww.com/amjclinicaloncology/abstract/2024/03000/emerging_futuristic_targeted_therapeutics__a.7.aspx

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Journal Name: Current Microbiology **IF: 2.6**

Title: Antimicrobial and Probiotic Potential of Lactobacilli Associated with Traditional Fermented Beverages

Author: Huidrom, Surmani; Mukherjee, Pulok K.; Devi, Sarangthem Indira

Details: Volume 81, Issue 5, Article number 137, April 2024

Abstract: Fermented foods have been recognized as a source of probiotic bacteria which can have a positive effect when administered to humans and animals. Discovering new probiotics in fermented food products poses a global economic and health importance. In this study, we investigated the antimicrobial and probiotic potential of lactobacilli isolated from fermented beverages produced traditionally by ethnic groups in Northeast India. Out of thirty Lactobacilli, fifteen exhibited strong antimicrobial activity against Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Enterobacter aerogenes with significant anti-biofilm and anti-quorum sensing activity. These isolates also showed characteristics associated with probiotic properties, such as tolerance to low pH and bile salts, survival in the gastric tract, auto-aggregation, and hydrophobicity without exhibiting hemolysis formation or resistance to certain antibiotics. The isolates were identified using gram staining, biochemical tests, and 16S rDNA sequencing. They exhibited probiotic potential, broad-spectrum of antibacterial activity, promising anti-biofilm, anti-quorum sensing activity, non-hemolytic, and tolerance to acidic pH and bile salts. Overall, four specific Lactobacillus isolates, Lactiplantibacillus plantarum BRD3A and Lacticaseibacillus paracasei RB10OW from fermented rice-based beverage, and Lactiplantibacillus plantarum RB30Y and Lacticaseibacillus paracasei MP11A from traditional local curd demonstrated potent antimicrobial and probiotic properties. These findings suggest that these lactobacilli isolates from fermented beverages have the potential to be used as probiotics with therapeutic benefits, highlighting the importance of traditional fermented foods for promoting gut health and infectious disease management.

URL: https://link.springer.com/article/10.1007/s00284-024-03656-2

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: Folia Microbiologica **IF: 2.6**

Title: Protein profiling and immunoinformatic analysis of the secretome of a metal-resistant environmental isolate Pseudomonas aeruginosa S-8

Author: Kumari, Kiran; Dey, Jyotirmayee; Mahapatra, Soumya Ranjan; Ma, Ying; Sharma, Parva Kumar; Misra, Namrata; Singh, Rajnish Prakash

Details: March 2024

Abstract: The bacterial secretome represents a comprehensive catalog of proteins released extracellularly that have multiple important roles in virulence and intercellular communication. This study aimed to characterize the secretome of an environmental isolate Pseudomonas aeruginosa S-8 by analyzing trypsin-digested culture supernatant proteins using nano-LC–MS/MS tool. Using a combined approach of bioinformatics and mass spectrometry, 1088 proteins in the secretome were analyzed by PREDLIPO, SecretomeP 2.0, SignalP 4.1, and PSORTb tool for their subcellular localization and further categorization of secretome proteins according to signal peptides. Using the gene ontology tool, secretome proteins were categorized into different functional categories. KEGG pathway analysis identified the secreted proteins into different metabolic functional pathways. Moreover, our LC–MS/MS data revealed the secretion of various CAZymes into the extracellular milieu, which suggests its strong biotechnological applications to breakdown complex carbohydrate polymers. The identified immunodominant epitopes from the secretome of P. aeruginosa showed the characteristic of being non-allergenic, highly antigenic, nontoxic, and having a low risk of triggering autoimmune responses, which highlights their potential as successful vaccine targets. Overall, the identification of secreted proteins of P. aeruginosa could be important for both diagnostic purposes and the development of an effective candidate vaccine.

URL: https://link.springer.com/article/10.1007/s12223-024-01152-5