SCHOLARLY PUBLICATIONS
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Journal Name: **Molecular Cancer** **IF: 27.7**

Title: Modulation of the tumor microenvironment and mechanism of immunotherapy-based drug resistance in breast cancer

Author: Kundu M., Butti R., Panda V.K., Malhotra D., Das S., Mitra T., Kapse P., Gosavi S.W., Kundu G.C.

Details: Volume 23, Issue 1, December 2024

Abstract: Breast cancer, the most frequent female malignancy, is often curable when detected at an early stage. The treatment of metastatic breast cancer is more challenging and may be unresponsive to conventional therapy. Immunotherapy is crucial for treating metastatic breast cancer, but its resistance is a major limitation. The tumor microenvironment (TME) is vital in modulating the immunotherapy response. Various tumor micro-environmental components, such as cancer-associated fibroblasts (CAFs), tumor-associated macrophages (TAMs), and myeloid-derived suppressor cells (MDSCs), are involved in TME modulation to cause immunotherapy resistance. This review highlights the role of stromal cells in modulating the breast tumor microenvironment, including the involvement of CAF-TAM interaction, alteration of tumor metabolism leading to immunotherapy failure, and other latest strategies, including high throughput genomic screening, single-cell and spatial omics techniques for identifying tumor immune genes regulating immunotherapy response. This review emphasizes the therapeutic approach to overcome breast cancer immune resistance through CAF reprogramming, modulation of TAM polarization, tumor metabolism, and genomic alterations.

URL: https://molecular-cancer.biomedcentral.com/articles/10.1186/s12943-024-01990-4

SCHOLARLY PUBLICATIONS
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Journal Name: **Autophagy** **IF: 14.6**

Title: NCoR1: a key player regulating mycobacterium tuberculosis pathogenesis

Author: Sen K., Biswas V.K., Ghosh A., Prusty S., Nayak S.P., Podder S., Gupta B. & Raghav S.K.

Details: Volume 20, Issue 3, March 2024

Abstract: Mycobacterium tuberculosis (Mtb) employs a multifaceted arsenal to elude host defense mechanisms, including those associated with autophagy and lysosome function. Within the realm of host-pathogen interactions, NCOR1, a well-recognized transcriptional co-repressor, is known to associate with a multitude of protein complexes to effect the repression of a diverse spectrum of genes. However, its role in regulating macroautophagy/autophagy, lysosome biogenesis, and, by extension, Mtb pathogenesis remains unexplored. The depletion of NCOR1 assumes a pivotal role in the control of the AMPK-MTOR-TFEB signaling axis, thereby fine-tuning cellular ATP homeostasis. This finely orchestrated adjustment further alters the profile of proteins involved in autophagy and lysosomal biogenesis through its master regulator, TFEB, culminating in the increased Mtb survival within the host milieu. Furthermore, the treatment of NCOR1-depleted cells with either rapamycin, antimycin A, or metformin demonstrates a capacity to restore the TFEB activity and LC3-II levels, consequently restoring the capacity of host cells to clear Mtb. Additionally, exogenous NCOR1 expression rescues the AMPK-MTOR-TFEB signaling axis and essentially the autophagic induction machinery. Overall, these findings demonstrate a crucial role of NCOR1 in regulating Mtb pathogenesis within myeloid cells and sheds light toward its involvement in the development of novel host-directed therapies.

URL: https://www.tandfonline.com/doi/full/10.1080/15548627.2023.2277583

SCHOLARLY PUBLICATIONS
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Journal Name: **Chemical Engineering Journal** **IF: 13.3**

Title: Sprayable biogenic Ag-collagen nanocomposites with potent antibacterial and antibiofilm activity for Acinetobacter baumannii infected wound healing under hyperglycemic condition

Author: Sucharita Singh S., Jena B., Roy S., Nayak S., Behera S.K., Chakrabortty S., Tripathy S.K., Ali Khan M., Kumar R., Jeon B.-H., StÃ¥lsby Lundborg C. & Mishra A.

Details: Volume 490 , June 2024

Abstract: Owing to their susceptibility to infection by drug-resistant bacteria, refractory wounds pose a formidable risk to the well-being of patients with diabetes and other immune-compromised conditions, and their management poses significant economic distress to the healthcare system, particularly in low and middle-income countries. Therefore, deployable interventions for rapid and effective management of such wounds are needed. In the present study, we report the processing of sprayable biogenic Ag-collagen nanocomposites (Ag-Col NCs) with cogent antibacterial and healing activity in Acinetobacter baumannii infected wounds under hyperglycemic conditions. Silver nanoparticles (Ag NPs) has been synthesized by using the plant extract of Urginea indica (U. indica), which was further used for the processing of Ag-Col NCs. Synthesized NCs were found to have notable broad spectrum antibacterial activity against clinically significant strains (Acinetobacter baumannii, Staphylococcus aureus and Methicillin-resistant Staphylococcus aureus) and appreciable biocompatibility towards RAW 264.7 and 3 T3 mouse fibroblast cell lines. The sprayable NC system was found to promote the wound healing activity in mouse model (Balb/c) not only in normal but also in hyperglycemic conditions. Our experimental findings suggest the potential of the Ag-Col NC spray in chronic wound management and an exploitable option in both clinical and personalized settings.

URL: https://www.sciencedirect.com/science/article/abs/pii/S1385894724032753?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **Cancer Treatment Reviews** **IF: 9.6**

Title: Havoc in harmony: Unravelling the intricacies of angiogenesis orchestrated by the tumor microenvironment

Author: Acharya S.S., Kundu C.N.

Details: Volume 127, June 2024

Abstract: Cancer cells merely exist in isolation; rather, they exist in an intricate microenvironment composed of blood vessels, signalling molecules, immune cells, stroma, fibroblasts, and the ECM. The TME provides a setting that is favourable for the successful growth and survivance of tumors. Angiogenesis is a multifaceted process that is essential for the growth, invasion, and metastasis of tumors. TME can be visualized as a "concert hall," where various cellular and non-cellular factors perform in a "symphony" to orchestrate tumor angiogenesis and create "Havoc" instead of "Harmony". In this review, we comprehensively summarized the involvement of TME in regulating tumor angiogenesis. Especially, we have focused on immune cells and their secreted factors, inflammatory cytokines and chemokines, and their role in altering the TME. We have also deciphered the crosstalk among various cell types that further aids the process of tumor angiogenesis. Additionally, we have highlighted the limitations of existing anti-angiogenic therapy and discussed various potential strategies that could be used to overcome these challenges and improve the efficacy of anti-angiogenic therapy.

URL: https://www.sciencedirect.com/science/article/pii/S030573722400077X?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Cancer Letters** **IF: 9.1**

Title: Nanoparticle-mediated metronomic chemotherapy in cancer: A paradigm of precision and persistence

Author: Kirti A., Simnani F.Z., Jena S., Lenka S.S., Kalalpitiya C., Naser S.S., Singh D., Choudhury A., Sahu R.N., Yadav A., Sinha A., Nandi A., Panda P.K., Kaushik N.K., Suar M. & Verma S.K.

Details: Volume 594 , July 2024

Abstract: Current methods of cancer therapy have demonstrated enormous potential in tumor inhibition. However, a high dosage regimen of chemotherapy results in various complications which affect the normal body cells. Tumor cells also develop resistance against the prescribed drugs in the whole treatment regimen increasing the risk of cancer relapse. Metronomic chemotherapy is a modern treatment method that involves administering drugs at low doses continuously, allowing the drug sufficient time to take its effect. This method ensures that the toxicity of the drugs is to a minimum in comparison to conventional chemotherapy. Nanoparticles have shown efficacy in delivering drugs to the tumor cells in various cancer therapies. Combining nanoparticles with metronomic chemotherapy can yield better treatment results. This combination stimulates the immune system, improving cancer cells recognition by immune cells. Evidence from clinical and pre-clinical trials supports the use of metronomic delivery for drug-loaded nanoparticles. This review focuses on the functionalization of nanoparticles for improved drug delivery and inhibition of tumor growth. It emphasizes the mechanisms of metronomic chemotherapy and its conjunction with nanotechnology. Additionally, it explores tumor progression and the current methods of chemotherapy. The challenges associated with nano-based metronomic chemotherapy are outlined, paving the way for prospects in this dynamic field.

URL: https://www.sciencedirect.com/science/article/pii/S0304383524003847?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Reviews in Medical Virology** **IF: 9.0**

Title: Transmission dynamics, complications and mitigation strategies of the current mpox outbreak: A comprehensive review with bibliometric study

Author: Mohapatra R.K., Singh P.K., Branda F., Mishra S., Kutikuppala L.V.S., Suvvari T.K., Kandi V., Ansari A., Desai D.N., Alfaresi M., Kaabi N.A.A., Fares M.A.A., Garout M., Halwani M.A., Alissa M. & Rabaan A.A.

Details: Volume 34, Issue 3, May 2024

Abstract: As the mankind counters the ongoing COVID-19 pandemic by the novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), it simultaneously witnesses the emergence of mpox virus (MPXV) that signals at global spread and could potentially lead to another pandemic. Although MPXV has existed for more than 50 years now with most of the human cases being reported from the endemic West and Central African regions, the disease is recently being reported in non-endemic regions too that affect more than 50 countries. Controlling the spread of MPXV is important due to its potential danger of a global spread, causing severe morbidity and mortality. The article highlights the transmission dynamics, zoonosis potential, complication and mitigation strategies for MPXV infection, and concludes with suggested 'one health' approach for better management, control and prevention. Bibliometric analyses of the data extend the understanding and provide leads on the research trends, the global spread, and the need to revamp the critical research and healthcare interventions. Globally published mpox-related literature does not align well with endemic areas/regions of occurrence which should ideally have been the scenario. Such demographic and geographic gaps between the location of the research work and the endemic epicentres of the disease need to be bridged for greater and effective translation of the research outputs to pubic healthcare systems, it is suggested.

URL: https://onlinelibrary.wiley.com/doi/10.1002/rmv.2541

SCHOLARLY PUBLICATIONS
School of Biotechnology
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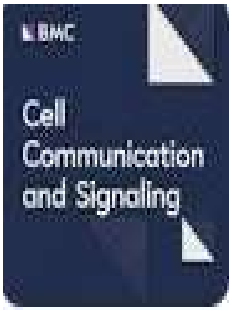
Journal Name: **Cell Communication and Signaling** **IF: 8.2**

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

Author: Bhattacharjee A., Jana A., Bhattacharjee S., Mitra S., De S., Alghamdi B.S., Alam M.Z., Mahmoud A.B., Al Shareef Z., Abdel-Rahman W.M., Woon-Khiong C., Alexiou A., Papadakis M., Ashraf G.M.

Details: Volume 22 , Issue 1, December 2024

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: **Journal of Environmental Management** **IF: 8.0**

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

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?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **International Journal of Biological Macromolecules** **IF: 7.7**

Title: Lysine acetylation of Hsp16.3: Effect on its structure, chaperone function and influence towards the growth of Mycobacterium tuberculosis

Author: Barik S., Panda A.K., Biswas V.K., Das S., Chakraborty A., Beura S., Modak R., Raghav S.K., Kar R.K., Biswas A.

Details: Volume 2688, May 2024

Abstract: Hsp16.3 plays a vital role in the slow growth of Mycobacterium tuberculosis via its chaperone function. Many secretory proteins, including Hsp16.3 undergo acetylation in vivo. Seven lysine (K) residues (K64, K78, K85, K114, K119, K132 and K136) in Hsp16.3 are acetylated inside pathogen. However, how lysine acetylation affects its structure, chaperone function and pathogen's growth is still elusive. We examined these aspects by executing in vitro chemical acetylation (acetic anhydride modification) and by utilizing a lysine acetylation mimic mutant (K64Q/K78Q/K85Q/K114Q/K119Q/K132Q/K136Q). Far- and near-UV CD measurements revealed that the chemically acetylated proteins(s) and acetylation mimic mutant has altered secondary and tertiary structure than unacetylated/wild-type protein. The chemical modification and acetylation mimic mutation also disrupted the oligomeric assembly, increased surface hydrophobicity and reduced stability of Hsp16.3, as revealed by GF-HPLC, 4,4'-dianilino-1,1'-binaphthyl-5,5'-disulfonic acid binding and urea denaturation experiments, respectively. These structural changes collectively led to an enhancement in chaperone function (aggregation and thermal inactivation prevention ability) of Hsp16.3. Moreover, when the H37Rv strain expressed the acetylation mimic mutant protein, its growth was slower in comparison to the strain expressing the wild-type/unacetylated Hsp16.3. Altogether, these findings indicated that lysine acetylation improves the chaperone function of Hsp16.3 which may influence pathogen's growth in host environment.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0141813024025686?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **International Journal of Biological Macromolecules** **IF: 7.7**

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

Author: Singh, Abhishek; Kumar, Satish; Acharya, Tusar Kanta; Kumar, Shamit; Chawla, Saurabh; Goswami, Chandan; Goswami, Luna

Details: Volume 264 , April 2024

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: **Food Research International** **IF: 7.0**

Title: Efficacy of amino acids in sports nutrition- review of clinical evidences

Author: Duttagupta S., Krishna Roy N., Dey G.

Details: Volume 187, July 2024

Abstract: The efficacy of amino acids as popular sports supplements has triggered debates, with their impact on athletic performance varying across sports disciplines due to diversity and heterogeneity in clinical trials. This review evaluates the ergogenic potential of amino acids, by critical appraisal of results of clinical trials of Branched chain amino acids (BCAAs), arginine, glutamine, citrulline, β-alanine, and taurine, performed on elite sportsmen from various land and water sports. Clinical trials reviewed here confirm notable physiological benefits thereby supporting the claim that BCAA, citrulline and arginine in various doses can have positive effects on endurance and overall performance in sportsperson. Furthermore, results of clinical trials and metabolomic studies indicate that in future it would be more beneficial to design precise formulations to target the requirement of specific sports. For instance, some combinations of amino acids may be more suitable for long term endurance and some others may be suitable for short burst of excessive energy. The most important insights from this review are the identification of three key areas where research is urgently needed: a) Biomarkers that can identify the physiological end points and to distinguish the specific role of amino acid as anti-fatigue or reducing muscle soreness or enhancing energy b) In-depth sports-wise clinical trials on elite sportsperson to understand the ergogenic needs for the particular sports c) Design of precision formula for similar types of sports instead of common supplements.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0963996924003818?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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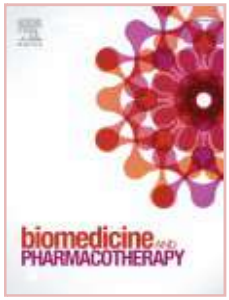
Journal Name: **Biomedicine & Pharmacotherapy** **IF: 6.9**

Title: Molecular insights to in vitro biocompatibility of endodontic Pulpotec with macrophages determined by oxidative stress and apoptosis

Author: Mohanty A, Patro S, Jha E, Patel P, Nandi A, Sinha A, Naser SS, Das A, Panda PK, Rout PK, Mishra R, Kaushik NK, Singh D, Suar M, Verma SK.

Details: Volume 176 , Jume 2024

Abstract: Pulp therapy has been emerged as a one of the efficient therapies in the field of endodontics. Among different types of new endodontic materials, pulpotec has been materialized as a recognized material for vital pulp therapy. However, its efficacy has been challenged due to lack of information about its cellular biocompatibility. This study evaluates the mechanistic biocompatibility of pulpotec cement with macrophage cells (RAW 264.7) at cellular and molecular level. The biocompatibility was evaluated using experimental and computational techniques like MTT assay, oxidative stress analysis and apoptosis analysis through flow cytometry and fluorescent microscopy. The results showed concentration-dependent cytotoxicity of pulpotec cement extract to RAW 264.7 cells with an LC 50 of X/10-X/20. The computational analysis depicted the molecular interaction of pulpotec cement extract components with metabolic proteins like Sod1 and p53. The study revealed the effects of Pulpotec cement's extract, showing a concentration-dependent induction of oxidative stress and apoptosis. These effects were due to influential structural and functional abnormalities in the Sod1 and p53 proteins, caused by their molecular interaction with internalized components of Pulpotec cement. The study provided a detailed view on the utility of Pulpotec in endodontic applications, highlighting its biomedical aspects.



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SCHOLARLY PUBLICATIONS
School of Biotechnology
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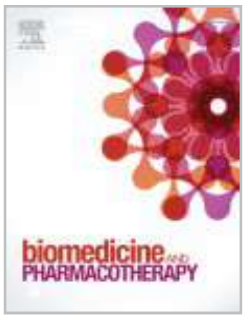
Journal Name: **Biomedicine and Pharmacotherapy** **IF: 6.9**

Title: Perilous paradigm of graphene oxide and its derivatives in biomedical applications: Insight to immunocompatibility

Author: Ayreen Z., Khatoon U., Kirti A., Sinha A., Gupta A., Lenka S.S., Yadav A., Mohanty R., Naser S.S., Mishra R., Chouhan R.S., Samal S.K., Kaushik N.K., Singh D., Suar M. & Verma S.K.

Details: Volume 176 , July 2024

Abstract: With advancements in nanotechnology and innovative materials, Graphene Oxide nanoparticles (GONP) have attracted lots of attention among the diverse types of nanomaterials owing to their distinctive physicochemical characteristics. However, the usage at scientific and industrial level has also raised concern to their toxicological interaction with biological system. Understanding these interactions is crucial for developing guidelines and recommendations for applications of GONP in various sectors, like biomedicine and environmental technologies. This review offers crucial insights and an in-depth analysis to the biological processes associated with GONP immunotoxicity with multiple cell lines including human whole blood cultures, dendritic cells, macrophages, and multiple cancer cell lines. The complicated interactions between graphene oxide nanoparticles and the immune system, are highlighted in this work, which reveals a range of immunotoxic consequences like inflammation, immunosuppression, immunostimulation, hypersensitivity, autoimmunity, and cellular malfunction. Moreover, the immunotoxic effects are also highlighted with respect to in vivo models like mice and zebrafish, insighting GO Nanoparticles' cytotoxicity. The study provides invaluable review for researchers, policymakers, and industrialist to understand and exploit the beneficial applications of GONP with a controlled measure to human health and the environment.



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SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: **Biomedicine and Pharmacotherapy** **IF: 6.9**

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

Author: Verma S.K., Nandi A., Sinha A., Patel P., Mohanty S., Jha E., Jena S., Kumari P., Ghosh A., Jerman I., Chouhan R.S., Dutt A., Samal S.K., Mishra Y.K., Varma R.S., Panda P.K., Kaushik N.K., Singh D., Suar M.

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

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

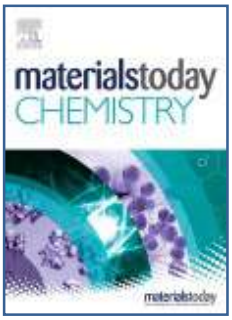
Journal Name: **Materials Today Chemistry** **IF: 6.7**

Title: Montmorillonite-reinforced xanthan gum-based biomaterial enhances biomineralization suitable for bone tissue engineering

Author: Singh A., Kumar S., Goswami C. & Goswami L.

Details: Volume 38, June 2024

Abstract: n the present study, we effectively constructed a biomaterial that consists of Xanthan gum, DEGDMA and montmorillonite infused as nanofillers for their prospective application in the restoration of bone. Utilizing FTIR, XRD, TGA, SEM, and numerous other techniques, each of the physicochemical features related to the synthesized biomaterial was characterized. The incorporation of montmorillonite was found to induce noticeable rheological characteristics. The fabricated biomaterial shows a more controlled release of drugs. The biocompatibility and the cytocompatibility of the synthesized biomaterial were demonstrated by the cellular attachment and growth of different secondary cell lines which remain active but do not produce enhanced ROS. An elevated ALP-activity, improved differentiation and increased mineralization by SaOS-2 cells on the developed biomaterial under an osteoinductive environment impart its capability for osteogenesis. This material can be used for delivering drugs and can serve as an affordable substrate for cellular activity. We claim that this material possesses the features suitable for bone tissue regeneration and restoration. We propose that the developed biomaterial has future implications in the biomedical sector at low cost.



URL: https://www.sciencedirect.com/science/article/pii/S2468519424001733?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

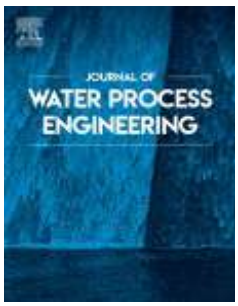
Journal Name: **Journal of Water Process Engineering** **IF: 6.3**

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

Author: Kumar R., Awino E., Njeri D.W., Basu A., Chattaraj S., Nayak J., Roy S., Khan G.A., Jeon B.H., Ghosh A.K., Pal S., Banerjee S., Rout P., Chakrabortty S. & Tripathy S.K.

Details: Volume 58 , February 20 24

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://ui.adsabs.harvard.edu/abs/2024JWPE...5804838K/abstract

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: **Journal of Industrial and Engineering Chemistry** **IF: 5.9**

Title: Technological advancements in the pretreatment of lignocellulosic biomass for effective valorization: A review of challenges and prospects

Author: Chakraborty P., Kumar R., Chakrabortty S., Saha S., Chattaraj S., Roy S., Banerjee A., Tripathy S.K., Kumar Ghosh A., Jeon B.-H.

Details: March 2024

Abstract: Potential green energy systems can be explored using competent waste lignocellulosic (LC) biomass transformation to energy, a promising and sustainable substitute for energy resources. The intrinsic recalcitrance caused by inhibitory components, primarily lignin, significantly inhibits biofuel production from LC biomass. LC biomass pretreatment facilitates its disintegration via surface area solubility enhancement and reduction of lignin concentration and cellulose crystallinity. Various pretreatment techniques that promote sustainable LC biomass conversion to valuable organic chemicals and biofuels have been employed to rapidly disintegrate the components (lignin, cellulose, and hemicellulose). Herein, we elucidate recent biomass pretreatment strategies and optimum values of their operating parameters that effectively utilize LC biocomponents. Considering economic feasibility and scale-up possibilities, microwave-assisted deep-eutectic solvent pretreatment can be one of the sustainable schemes for delignification (87 %) and biofuel production. This study offers insights into the selection of a highly effective and appropriate biomass pretreatment method for green and sustainable energy development.

URL: https://www.sciencedirect.com/science/article/abs/pii/S1226086X24001904?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **Journal of Industrial and Engineering Chemistry** **IF: 5.9**

Title: Understanding the antibacterial mechanism of a phytochemical derived from Urginea indica against Methicillin-Resistant Staphylococcus aureus: A phytochemical perspective to impede antibiotics resistance

Author: Jena B., Singh S.S., Chakrabortty S., Behera S.K., Tripathy S.K., Lundborg C.S., Kumar R., Ali Khan M., Jeon B.H. & Mishra A.

Details: April 2024

Abstract: Bacterial resistance to conventional antibiotics is a pressing concern in the realm of infectious disease treatment, given its rapid evolution. This underscores the urgency of identifying novel therapeutic compounds. Recent efforts have been concentrated on exploring natural sources of antibacterial compounds, with a particular focus on plant-based derivatives due to their enhanced biocompatibility. In this context, our research has led to the isolation and purification of a groundbreaking plant-based phytochemical derivative known as N-ethylacetamide. We meticulously tested its antibacterial activity against bacterial strains, Staphylococcus aureus and Methicillin-resistant Staphylococcus aureus. Remarkably, N-ethylacetamide exhibited substantial antibacterial and anti-biofilm effects within the concentration range of 5–15 µg/mL, offering promise for combating these pathogens. Our investigations revealed N-ethylacetamide's compatibility with mammalian cells, as evidenced by tests conducted on RAW 264.7 and 3 T3 fibroblast cell lines. The potential antibacterial efficacy of this purified compound was validated through in-vitro infection studies, and a positive immune response was observed in an in-vivo mice model (Balb/c). The accumulated experimental evidence underscores the potential of N-ethylacetamide as a therapeutic agent against bacterial infections. It presents the exciting possibility of addressing these challenges with minimal side effects, offering hope for a more effective and safer approach to combat bacterial diseases.

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SCHOLARLY PUBLICATIONS
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Journal Name: **Critical Reviews in Oncology/Hematology** **IF:5.5**

Title: The cytokines in tumor microenvironment: from cancer initiation-elongation-progression to metastatic outgrowth

Author: Pradhan, Rajalaxmi; Kundu, Anushka; Kundu & Chanakya Nath

Details: Volume 196, May 2024

Abstract: It is a well-known fact that cancer can be augmented by infections and inflammation. In fact, chronic inflammation establishes a tumor-supporting-microenvironment (TME), which contributes to neoplastic progression. Presently, extensive research is going on to establish the interrelationship between infection, inflammation, immune response, and cancer. Cytokines are the most essential components in this linkage, which are secreted by immune cells and stromal cells of TME. Cytokines have potential involvement in tumor initiation, elongation, progression, metastatic outgrowth, angiogenesis, and development of therapeutic resistance. They are also linked with increased cancer symptoms along with reduced quality of life in advanced cancer patients. The cancer patients experience multiple symptoms including pain, asthenia, fatigue, anorexia, cachexia, and neurodegenerative disorders etc. Anti-cancer therapeutics can be developed by targeting cytokines along with TME to reduce the immunocompromised state and also modulate the TME. This review article depicts the composition and function of different inflammatory cells within the TME, more precisely the role of cytokines in cancer initiation, elongation, and progression as well as the clinical effects in advanced cancer patients. It also provides an overview of different natural compounds, nanoparticles, and chemotherapeutic agents that can target cytokines along with TME, which finally pave the way for cytokines-targeted anti-cancer therapeutics.

URL: https://www.sciencedirect.com/science/article/pii/S1040842824000544?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **FEBS Journal** **IF: 5.5**

Title: Actionable mechanisms of drug tolerance and resistance in Mycobacterium tuberculosis

Author: Datta D., Jamwal S., Jyoti N., Patnaik S. & Kumar D.

Details: April 2024

Abstract: The emergence of antimicrobial resistance (AMR) across bacterial pathogens presents a serious threat to global health. This threat is further exacerbated in tuberculosis (TB), mainly due to a protracted treatment regimen involving a combination of drugs. A diversity of factors contributes to the emergence of drug resistance in TB, which is caused by the pathogen Mycobacterium tuberculosis (Mtb). While the traditional genetic mutation-driven drug resistance mechanisms operate in Mtb, there are also several additional unique features of drug resistance in this pathogen. Research in the past decade has enriched our understanding of such unconventional factors as efflux pumps, bacterial heterogeneity, metabolic states, and host microenvironment. Given that the discovery of new antibiotics is outpaced by the emergence of drug resistance patterns displayed by the pathogen, newer strategies for combating drug resistance are desperately needed. In the context of TB, such approaches include targeting the efflux capability of the pathogen, modulating the host environment to prevent bacterial drug tolerance, and activating the host anti-mycobacterial pathways. In this review, we discuss the traditional mechanisms of drug resistance in Mtb, newer understandings and the shaping of a set of unconventional approaches to target both the emergence and treatment of drug resistance in TB.

URL: https://febs.onlinelibrary.wiley.com/doi/10.1111/febs.17142

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Biomacromolecules** **IF: 5.5**

Title: Multifunctional Self-Healing Carbon Dot-Gelatin Bioadhesive: Improved Tissue Adhesion with Simultaneous Drug Delivery, Optical Tracking, and Photoactivated Sterilization

Author: Aggarwal M., Panigrahi H., Kotnees D.K. & Das P.

Details: Volume 25, Issue 5, May 2024

Abstract: Bioadhesives with all-inclusive properties for simultaneous strong and robust adhesion, cohesion, tracking, drug delivery, self-sterilization, and nontoxicity are still farfetched. Herein, a carbon dot (CD) is made to infuse each of the above-desired aspects with gelatin, an inexpensive edible protein. The CD derived through controlled hydrothermal pyrolysis of dopamine and terephthaldehyde retained -NH_2, -OH, -COOH, and, most importantly, -CHO functionality on the CD surface for efficient skin adhesion and cross-linking. Facile fabrication of CD-gelatin bioadhesive through covalent conjugation of -CHO of the CD with -NH_2 of gelatin through Schiff base formation was accomplished. This imparts remarkable self-healing attributes as well as excellent adhesion and cohesion evident from physicomechanical analysis in a porcine skin model. Improved porosity of the bioadhesive allows loading hemin as a model drug whose disembarkment is tracked with intrinsic CD photoluminescence. In a significant achievement, antibiotic-free self-sterilization of bioadhesive is demonstrated through visible light (white LED, 23 W)-irradiated photosensitization of the CD to produce reactive oxygen species for annihilation of both Gram-positive and Gram-negative bacteria with exceptional efficacy (99.9%). Thus, a comprehensive CD-gelatin bioadhesive for superficial and localized wound management is reported as a promising step for the transformation of the bioadhesive domain through controlled nanotization for futuristic clinical translations.

URL: https://pubs.acs.org/doi/10.1021/acs.biomac.4c00313

SCHOLARLY PUBLICATIONS
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Journal Name: **FEBS Journal** **IF: 5.5**

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

Author: Sharma A., Zehra A., Mathew S.J.

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/abs/10.1111/febs.17085

SCHOLARLY PUBLICATIONS
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Journal Name: **Journal of Molecular Liquids** **IF: 5.3**

Title: Improving the therapeutic window of anticancer agents by Î²-cyclodextrin encapsulation: Experimental and theoretical insights

Author: Priyadarsini Mishra N., Kumar Sahoo D., Mohapatra S., Nayak S., Nayak D., Nath Kundu C.

Details: Volume 104 , June 2024

Abstract: 3-Nitro-2H-chromene derivatives exhibit promising anticancer activities, but their clinical translation is hindered by poor aqueous solubility. Herein, we report a cyclodextrin complexation strategy to improve the solubility and therapeutic efficacy of 8-methoxy-2-(4-methoxy phenyl)-3-nitro-2H-chromene (MNC), a potent anticancer agent. Solid inclusion complexes of MNC: β-cyclodextrin (β-CD) were synthesized by co-precipitation and kneading methods, and comprehensively characterized using UV–vis, Fluorescence, Fourier Transform Infrared (FT-IR), Differential scanning calorimetry (DSC), X-ray diffraction (XRD), Scanning electron microscope (SEM), ^{1}H NMR, and mass spectrometric techniques. A 1:1 host–guest stoichiometry was verified by phase solubility and UV–Vis spectroscopic studies. β-CD complexation remarkably enhanced the aqueous solubility of hydrophobic MNC. Cytotoxicity evaluation against different human cancer cell lines such as breast cancer (MCF-7, MDA-MB-231), lung cancer (A549), and liver cancer (HepG2) demonstrated superior anticancer activity of the co-precipitated MNC: β-CD complex compared to free MNC and the chemotherapeutic 5-fluorouracil. Although the host–guest interaction energy obtained from molecular docking was modest (−5.1 kcal/mol), it facilitated effective MNC encapsulation and delivery by β-CD. Density functional theory (DFT) calculations provided further insights into the inclusion phenomenon. This cyclodextrin complexation approach paves the way for developing an effective MNC formulation with improved bioavailability and anticancer therapeutic efficacy.

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SCHOLARLY PUBLICATIONS
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Journal Name: **Life Sciences** **IF: 5.2**

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

Author: Dash S.R., Kundu A., Kundu C.N.

Details: Volume 341 , March 2024

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.

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SCHOLARLY PUBLICATIONS
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Journal Name: **Journal of Ethnopharmacology** **IF: 4.8**

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: Chanu K.D., Thoithoisana S., Kar A., Mukherjee P.K., Radhakrishnanand P., Parmar K., 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. Aim of the study: The aim of this study is to investigate the cytotoxic potential of A. adenophora hydroalcoholic leaves extract (AHL) on Colorectal cancer (CRC) cell lines (HCT-116, HCT-15 and HT-29), synergistic potential with chemotherapeutic drugs 5FU and Cisplatin as well as reactive oxygen species (ROS) generation, based on the sample collected from Mao district of Manipur, India. Identification of bioactive phytocompounds in AHL was also performed by HRLCMS. Conclusion: The present study evaluates the effectiveness of AHL against Colorectal cancer cell lines. AHL is cytotoxic and induces apoptosis in HCT-116 cells by caspase 3 activation and increased ROS production that can be attributed to sesquiterpenoids. Thus, the plant A. adenophora has therapeutic potential for Colorectal cancer and can be further exploited for developing anticancer drug.

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SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Journal of Ethnopharmacology** **IF: 4.8**

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

Author: Chanu W.K., Chatterjee A., Singh N., Nagaraj V.A. & Singh C.B.

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 Pf3D7 and artemisinin-resistant PfCam3.I^{R539T} cultures, and the in vivo antimalarial activity was analyzed in Plasmodium berghei (Pb) ANKA strain-infected BALB/c mouse model. Conclusion: The findings of this study demonstrated that traditionally used herbal medicinal plants like R. serrata provide a platform for the identification and isolation of potent bioactive phytochemicals that in turn can promote the antimalarial drug research. RsMeOH crude extract and RsEA fraction showed antiplasmodial, antimalarial and antioxidant activities. Chemical fingerprinting analysis suggested the presence of bioactive phytocompounds that are known for their antimalarial effects. Further detailed investigations on RsMeOH crude extract and RsEA fraction would be needed for the identification of the entire repertoire of the active antimalarial components with potent pharmaceutical and therapeutic values.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0378874123013363

SCHOLARLY PUBLICATIONS
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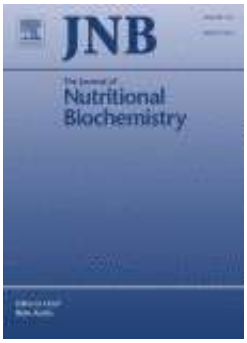
Journal Name: **Journal of Nutritional Biochemistry** **IF: 4.8**

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

Details: Volume 125 , March 2024

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



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

SCHOLARLY PUBLICATIONS
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Journal Name: **Polymer Composites** **IF: 4.8**

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

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

Details: Volume 45, Issue 1, January 2024

Abstract: Natural fibe r-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: **Journal of Ethnopharmacology** **IF: 4.8**

Title: Paris polyphylla Sm. characterized extract infused ointment accelerates diabetic wound healing in In-vivo model

Author: Kshetrimayum V., Chanu K.D., Biona T., Kar A., Haldar P.K., Mukherjee P.K., Sharma N.

Details: Volume 331 , September 2024

Abstract: Ethnopharmacological relevance: The dried rhizome of Paris polyphylla Sm. is extensively used by traditional healers in India, China, and Vietnam to treat skin inflammation, cut wounds, uterine and traumatic bleeding, and cancer. Aim of the study: The traditional use of P. polyphylla rhizomes for treating wounds and bleeding has been reported previously. However, the potential of P. polyphylla in the treatment of diabetic wounds has not yet been explored. Our present study focused on the investigation of the wound-healing activity of P. polyphylla infused ointment in streptozotocin (STZ)-induced diabetic rats to validate the traditional claim. Materials and methods: Hydroalcoholic extract of the dried rhizomes of P. polyphylla were quantified by validated and optimized HPTLC (High-performance thin layer chromatography) method for Paris saponin VII, Dioscin and Polyphyllin V. The extract was used to prepare P. polyphylla ointments (5 and 10%). P. polyphylla ointment was subjected to physiochemical analysis and skin irritation test. Thirty STZ-induced diabetic adult male Wistar albino rats were divided into five groups (n = 6) and a circular excision wound was created. P. polyphylla ointment, ointment base (OB), and standard (STD) (Povidone Iodine 10%) were administered topically. The wound area of all groups were recorded every six days and compared with that of control. The epithelization period of each group was recorded. On day 18, the histopathological study of skin tissues of all groups was performed using hematoxylin and eosin (H&E) and Mallory's trichrome (MT). Results: Marker analysis and quantification of phytomolecules in hydroalcoholic extract ofP. Polyphylla were found to be of paris saponin VII (3.28 ± 0.08% w/w), dioscin (1.94 ± 0.12% w/w), and polyphyllin V (1.87 ± 0.84% w/w). A physiochemical study of P. polyphylla ointment showed that the prepared ointment was within an acceptable range and was not irritable to the skin. Daily topical administration of 10% P. polyphylla ointment (PP10) for 18 days completely healed the STZ-induced diabetic wounds. On day 18, the 5% P. polyphylla ointment (PP5) showed 99.1 ± 2.9% wound closure, while that of the standard and control was 78.4 ± 7.3% and 18.5 ± 5.9%, respectively. The epithelialization period of PP10 was 18 days, whereas that of the control was 28 days. Histopathological analysis of the progression of PP10 and PP5 wounds showed a decrease in inflammatory cells, regenerated epithelial layer, keratosis layer, hair follicles, fibroblasts, and collagen. Upon collagen intensity quantification of MT stained sections, an increase in collagen density of PP10 and PP5 treated groups was observed, showing accelerated wound healing potential of P. polyphylla extract in diabetic wounds compared to the standard ointment. Conclusion: This study suggested the potential of P. polyphylla rhizomes derived formulation to treat diabetic wounds, although the plant is traditionally used to treat normal wounds. The results indicate the validation of traditional claim, which has been explored commercially in industrial aspect.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0378874124005956?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **American Journal of Pathology** **IF: 4.7**

Title: Aurora kinase A is overexpressed in human retinoblastoma and correlates with histopathological high-risk factors: implications for targeted therapy

Author: Borah NA, Mittal R, Sucharita S, Rath S, Kaliki S, Patnaik S, Tripathy D, Reddy MM.

Details: June 2024

Abstract: Retinoblastoma (RB) is an intraocular malignancy initiated by loss of *RB1* function and/or dysregulation of *MYCN* oncogene. RB is primarily treated with chemotherapy; however, systemic toxicity and long-term side effects remain a significant challenge necessitating the identification of specific molecular targets. Aurora kinase A (AURKA), a critical cell cycle regulator, contributes to cancer pathogenesis especially in *RB1*-deficient and *MYCN* dysregulated tumors. Our immunohistochemistry study in patient specimens (n=67) discovered that AURKA is overexpressed in RB and elevated expression correlates with one or more histopathological high-risk factors such as tumor involvement of the optic nerve, choroid, sclera and/or anterior segment. More specifically, AURKA is ubiquitously expressed in majority of the advanced-stage RB tumors that show a sub-optimal response to chemotherapy. shRNA-mediated depletion/pharmacological inhibition studies in cell lines, patient-derived cells, *in-vivo* xenografts, and enucleated patient specimens confirm that RB cells are highly sensitive to a lack of functional AURKA. In addition, we deciphered that AURKA and MYCN associate with each other to regulate their levels in RB cells. Overall, our results demonstrate a previously unknown upregulation of AURKA in RB, facilitated by its crosstalk with MYCN, and elevated levels of this kinase may indicate unfavorable prognosis in tumors refractory to chemotherapy. This study provides a rationale and confirms that therapeutic targeting of elevated AURKA in RB could be a potential treatment approach.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0002944024002050

SCHOLARLY PUBLICATIONS
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Journal Name: **Journal of Insects as Food and Feed** **IF: 4.7**

Title: Heteropterans: a treasure trove of therapeutic proteins

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

Details: Volume 8 , January 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/article-10.1163-23524588-00001062.xml

SCHOLARLY PUBLICATIONS
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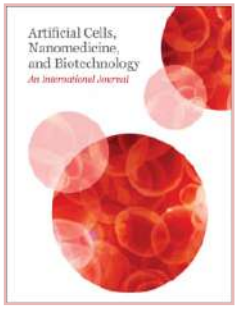
Journal Name: **Artificial Cells, Nanomedicine and Biotechnology** **IF: 4.5**

Title: Green synthesized silver nanoparticles of Terminalia bellirica leaves extract: synthesis, characterization, in-silico studies, and antimalarial activity

Author: Singh S., Arya H., Sahu W., Reddy K.S., Nimesh S., Alotaibi B.S., Hakami M.A., Almasoudi H.H., Hessien K.B.G., Hasan M.R., Rashid S., Kumar Bhatt T.

Details: Volume 52, Issue 1, May 2024

Abstract: Malaria is a mosquito-borne infectious disease that is caused by the Plasmodium parasite. Most of the available medication are losing their efficacy. Therefore, it is crucial to create fresh leads to combat malaria. Green silver nanoparticles (AgNPs) have recently attracted a lot of attention in biomedical research. As a result, green mediated AgNPs from leaves of Terminalia bellirica, a medicinal plant with purported antimalarial effects, were used in this investigation. Initially, cysteine-rich proteins from Plasmodium species were studied in silico as potential therapeutic targets. With docking scores between −9.93 and −11.25 kcal/mol, four leaf constituents of Terminalia bellirica were identified. The green mediated silver nanoparticles were afterward produced using leaf extract and were further examined using UV-vis spectrophotometer, DLS, Zeta potential, FTIR, XRD, and FESEM. The size of synthesized TBL-AgNPs was validated by the FESEM results; the average size of TBL-AgNPs was around 44.05 nm. The zeta potential study also supported green mediated AgNPs stability. Additionally, Plasmodium falciparum (3D7) cultures were used to assess the antimalarial efficacy, and green mediated AgNPs could effectively inhibit the parasitized red blood cells (pRBCs). In conclusion, this novel class of AgNPs may be used as a potential therapeutic replacement for the treatment of malaria.



URL: https://www.tandfonline.com/doi/full/10.1080/21691401.2024.2339429

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Environmental and Experimental Botany** **IF: 4.5**

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

Author: Chanwala J., Jha D.K., Giri M.K. & Dey N.

Details: Volume 219 , March 2024

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

SCHOLARLY PUBLICATIONS
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Journal Name: **Translational Oncology** **IF: 4.5**

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 pre-existing 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 pre-existing 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

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Journal Name: **ACS Biomaterials Science and Engineering** **IF: 4.5**

Title: Revolutionizing Cancer Treatment: The Promising Horizon of Zein Nanosystems

Author: Preetam S., Duhita Mondal D., Mukerjee N., Naser S.S., Tabish T.A. & Thorat N.

Details: Volume 10 , Issue 4, April 2024

Abstract: Various nanomaterials have recently become fascinating tools in cancer diagnostic applications because of their multifunctional and inherent molecular characteristics that support efficient diagnosis and image-guided therapy. Zein nanoparticles are a protein derived from maize. It belongs to the class of prolamins possessing a spherical structure with conformational properties similar to those of conventional globular proteins like ribonuclease and insulin. Zein nanoparticles have gained massive interest over the past couple of years owing to their natural hydrophilicity, ease of functionalization, biodegradability, and biocompatibility, thereby improving oral bioavailability, nanoparticle targeting, and prolonged drug administration. Thus, zein nanoparticles are becoming a promising candidate for precision cancer drug delivery. This review highlights the clinical significance of applying zein nanosystems for cancer theragnostic–moreover, the role of zein nanosystems for cancer drug delivery, anticancer agents, and gene therapy. Finally, the difficulties and potential uses of these NPs in cancer treatment and detection are discussed. This review will pave the way for researchers to develop theranostic strategies for precision medicine utilizing zein nanosystems.

URL: https://pubs.acs.org/doi/10.1021/acsbiomaterials.3c01540

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Journal Name: **ACS Biomaterials Science and Engineering** **IF: 4.5**

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 Ca2+ 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 Ca2+, 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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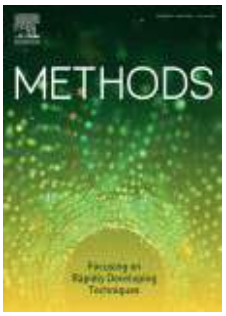
Journal Name: **Methods** **IF: 4.2**

Title: Optimisation ofLevilactobacillus brevis-fermented finger millet (Eleusine coracana) and evaluation of its effects on cancer cells (HCT116 and MDA-MB-231)

Author: Kumar Mahanta S, Pratikshya Nayak P, Muduli K, Elangovan S, Paramasivan SS, Kumar Mallick P, Kumar Mohapatra S, Kumar Panda S.

Details: Volume 229, September 2024

Abstract: he objective of this study was to optimise the millet formulation using *Levilactobacillus brevis* and to evaluate its anticarcinogenic potential *in vitro*. The formula was developed in the course of the fermentation of finger millet (*Eleusine coracana*) using *L. brevis* MTTC 4460 and optimised by response surface methodology and validation by artificial neural networking (ANN). The optimised millet formulation could be obtained using 2 % of bacterial inoculum, 2 % of glucose, and a fermentation duration of 3.3 days with a yield of 5.98 mg/mL lactic acid and 3.38 $\log_{10}$ (CFU/mL) viable *L. brevis* with overall desirability value of 1. The fermented millet formulation exhibited antiproliferative and antimigratory effects on MDA-MB-231 and HCT116 cancer cell lines. In addition, the outcomes observed in western blot analysis revealed that the formulation elicited apoptotic responses mediated by the Bcl-2 family of proteins in MDA-MB-231 and HCT116 cell lines while demonstrating no discernible impact on HEK293 normal cells.



URL: https://www.sciencedirect.com/science/article/abs/pii/S1046202324001506

SCHOLARLY PUBLICATIONS
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Journal Name: **Biomedical Materials (Bristol)** **IF: 3.9**

Title: Surface engineered nanodiamonds: mechanistic intervention in biomedical applications for diagnosis and treatment of cancer

Author: Dey T., Ghosh A., Sanyal A., Charles C.J., Pokharel S., Nair L., Singh M., Kaity S., Ravichandiran V., Kaur K., Roy S.

Details: Volume 19, Issue 3, May 2024

Abstract: In terms of biomedical tools, nanodiamonds (ND) are a more recent innovation. Their size typically ranges between 4 to 100 nm. ND are produced via a variety of methods and are known for their physical toughness, durability, and chemical stability. Studies have revealed that surface modifications and functionalization have a significant influence on the optical and electrical properties of the nanomaterial. Consequently, surface functional groups of NDs have applications in a variety of domains, including drug administration, gene delivery, immunotherapy for cancer treatment, and bio-imaging to diagnose cancer. Additionally, their biocompatibility is a critical requisite for their in vivo and in vitro interventions. This review delves into these aspects and focuses on the recent advances in surface modification strategies of NDs for various biomedical applications surrounding cancer diagnosis and treatment. Furthermore, the prognosis of its clinical translation has also been discussed.

URL: https://iopscience.iop.org/article/10.1088/1748-605X/ad3abb

SCHOLARLY PUBLICATIONS
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Journal Name: **Scientific Reports** **IF: 3.8**

Title: Endophytic fungi of Panax sokpayensis produce bioactive ginsenoside Compound K in flask fermentation

Author: Rai S., Singh L.S., Shaanker R.U., Jeyaram K., Parija T., Sahoo D.

Details: Volume 14, Issue 1, December 2024

Abstract: Endophytes of Panax have the potential to produce their host plant secondary metabolites, ginsenosides. Panax sokpayensis, an endemic traditional medicinal plant of the Sikkim Himalayas was explored for the isolation of endophytic fungi. In the present study, we have isolated 35 endophytic fungal cultures from the rhizome of P. sokpayensis and screened for ginsenosides production by HPLC by comparing the peak retention time with that of standard ginsenosides. The HPLC analysis revealed that out of 35 isolates, the mycelial extracts of four fungal endophytes (PSRF52, PSRF53, PSRF49 and PSRF58) exhibited peaks with a similar retention time of the standard ginsenoside, Compound K (CK). LC–ESI–MS/MS analysis led to the sconfirmation of ginsenoside CK production by the four fungal endophytes which showed a compound with m/z 639.6278, similar to that of standard ginsenoside CK with yield in potato dextrose broth flask fermentation ranging from 0.0019 to 0.0386 mg/g of mycelial mass in dry weight basis. The four prospective fungal endophyte isolates were identified as Thermothielavioides terrestris PSRF52, Aspergillus sp. PSRF49, Rutstroemiaceae sp. strain PSRF53, and Phaeosphaeriaceae sp. strain PSRF58 based on ITS sequencing. The present finding highlights the need for further study on growth optimization and other culture parameters to exploit the endophytes as an alternative source for ginsenoside CK production.

URL: https://www.nature.com/articles/s41598-024-56441-3

SCHOLARLY PUBLICATIONS
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Journal Name: **Pest Management Science** **IF: 3.8**

Title: Pyramiding BPH genes in rice maintains resistance against the brown planthopper under climate change

Author: Wang C.-L., Luo P.-Q., Hu F.-Y., Li Y., Sung C.-L., Kuang Y.-H., Lin S.-C., Yang Z.-W., Li C.-P., Huang S.-H., Hechanova S.L., Jena K.K., Hsieh C.-H. & Chuang W.-P.

Details: Volume 80, Issue 4, April 2024

Abstract: BACKGROUND: Nilaparvata lugens (brown planthopper; BPH) is a significant rice pest in Asia, causing substantial yield losses. Pyramiding BPH resistance genes with diverse resistance traits into rice cultivars is an effective strategy for pest management. However, the response of pyramiding combinations to environmental changes remains unclear. To address this knowledge gap, we investigated three pyramiding rice lines (BPH2 + 32, BPH9 + 32, and BPH18 + 32) in the context of varying climate change conditions, ensuring sufficient N. lugens–rice interactions. Thus, we set three environmental conditions [30/25 °C (day/night) with 500 ppm CO_2 concentration, 32/27 °C (day/night) with 600 ppm CO_2 concentration, and 35/30 °C (day/night) with 1000 ppm CO_2 concentration]. RESULTS: All three pyramiding rice lines maintained the insect resistant ability under the three environmental settings. In particular, the BPH18 + 32 rice line exhibited stronger antibiotic and antixenosis effects against N. lugens. In addition, BPH18 + 32 rice line had better shoot resilience under N. lugens infestation, whereas the performance of the other two selected pyramiding rice lines varied. Thus, although BPH2, BPH9, and BPH18 represent three alleles at the same locus, their resistance levels against N. lugens may vary under distinct climate change scenarios, as evidenced by the performance of N. lugens on the three pyramiding rice lines. CONCLUSION: Our findings indicate that all three tested pyramiding rice lines maintained their insect resistance in the face of diverse climate change scenarios. However, these lines exhibited varied repellent responses and resilience capacities in response to climate change. Thus, the combination of pyramiding genes needs to be considered for future breeding programs.

URL: https://scijournals.onlinelibrary.wiley.com/doi/10.1002/ps.7902

SCHOLARLY PUBLICATIONS
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Journal Name: **ACS Omega** **IF: 3.7**

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

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

Details: Volume 9, Issue 2, 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://pubs.acs.org/doi/10.1021/acsomega.3c07950

SCHOLARLY PUBLICATIONS
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Journal Name: **ACS Omega** **IF: 3.7**

Title: Carbon Dots and Their Polymeric Nanocomposites: Insight into Their Synthesis, Photoluminescence Mechanisms, and Recent Trends in Sensing Applications

Author: Kar D.K., Praveenkumar V., Si S., Panigrahi H., Mishra S.

Details: Volume 9, Issue 10, March 2024

Abstract: Carbon dots (CDs), a novel class of carbon-based nanoparticles, have received a lot of interest recently due to th eir exceptional mechanical, chemical, and fluorescent properties, as well as their excellent photostability and biocompatibility. CDs' emission properties have already found a variety of potential applications, in which bioimaging and sensing are major highlights. It is widely acknowledged that CDs' fluorescence and surface conditions are closely linked. However, due to the structural complexity of CDs, the specific underlying process of their fluorescence is uncertain and yet to be explained. Because of their low toxicity, robust and wide optical absorption, high chemical stability, rapid transfer characteristics, and ease of modification, CDs have been recognized as promising carbon nanomaterials for a variety of sensing applications. Thus, following such outstanding properties of CDs, they have been mixed and imprinted onto different polymeric components to achieve a highly efficient nanocomposite with improved functional groups and properties. Here, in this review, various approaches and techniques for the preparation of polymer/CDs nanocomposites have been elaborated along with the individual characteristics of CDs. CDs/polymer nanocomposites recently have been highly demanded for sensor applications. The insights from this review are detailed sensor applications of polymer/CDs nanocomposites especially for detection of different chemical and biological analytes such as metal ions, small organic molecules, and several contaminants.

URL: https://pubs.acs.org/doi/10.1021/acsomega.3c07612

SCHOLARLY PUBLICATIONS
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Journal Name: **ACS Omega** **IF: 3.7**

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, April 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
School of Biotechnology
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Journal Name: **Planta** **IF: 3.6**

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

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

Details: Volume 259, Issue 1, January 2024

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

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

SCHOLARLY PUBLICATIONS
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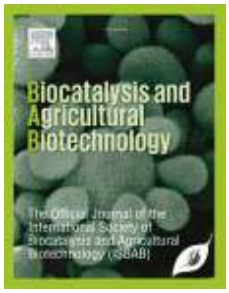
Journal Name: **Biocatalysis and Agricultural Biotechnology** **IF: 3.4**

Title: Microalgal nanobiotechnology for biosynthesis of metallic nanoparticles: In-depth into the strategies, mechanism and nanofluidic hydrodynamics

Author: Deb D., Sutradhar A.

Details: Volume 56, February 2024

Abstract: A revolutionary method called 'nanotechnology' is used to develop and use materials at the nanoscale. Although researches in this field have gained significant impetus over the years, the sustainability of the conventionally employed physical and chemical methods for nanoparticle generation is still in question. More recently, utilization of microalgal cell factories for the metal-nanoparticle biosynthesis is being increasingly advocated as a sustainable solution over the traditional approaches. Microalgae with their exceptional ecological and economic benefits have emerged as fascinating systems for green synthesis of nanoparticle. The present review article comprehensively elucidates the strategies developed so far for microalgae mediated metallic nanoparticle synthesis alongside focusing on the mechanism of the process. The role of process control and effective parameters to manage physical properties of nanoparticles such size, shape, dispersity, and stability have also been summarized. The concurrent focus on the nanofluid hydrodynamics including Brownian motion due to the suspension of nanoparticles, and viscosity changes of nanofluid owing to suspended nanoparticles further makes this paper robust. Such in-depth understanding from the mathematical perspective would pave the way for novel and innovative ideas to design more optimized strategies for microalgae-based nanoparticle generation.



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