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: **Renewable & Sustainable Energy Reviews** **IF: 16.3**

Title: Roles of engineered lignocellulolytic microbiota in bioaugmenting lignocellulose biomethanatio

Author: Basak, B; Kumar, R; Tanpure, RS; Mishra, A; Tripathy, SK; Chakrabortty, S; Roh, HS; Yadav, KK; Chung, WJ; Jeon, BH

Details: Volume 207, January 2025

Abstract: The recalcitrance and physiochemical complexity of lignocellulosic biomass limit its hydrolysis and subsequent anaerobic digestion to produce biomethane. Restricted lignocellulose hydrolysis reduces the substrate supply to catabolic pathways of anaerobic digestion, altering the indigenous digester microbiota by affecting the syntrophy between hydrolytic, acidogenic, and acetogenic bacterial and methanogenic archaeal communities. This can considerably impede the maximum utilization of this potential biomass resource, resulting in poor biomass-to-biomethane conversion. Bioaugmentation of anaerobic digestion with potent lignocellulolytic microbes can enhance rate-limiting hydrolytic pathways to convert lignocellulosic biomass into biomethane efficiently. Bioaugmentation can enrich lignocellulose-degrading microbiota in digesters through complementary metabolic and transcription processes. Although the positive roles of bioaugmentation in improving lignocellulose digestion have been well-established, efforts are still underway to properly attribute the role of bioaugmentation to specific microbiota compositions and their metabolic functions. Assessing the stability, dynamics, and specific metabolic roles of different microbial guilds of the bioaugmenting lignocellulolytic microbiota and their intricate interactions with the indigenous microbiota, along with deterministic process factors, is pivotal for the successful real-scale execution of bioaugmented lignocellulose digestion. To clarify, studies have adopted an integrated approach of high-throughput meta-omics to identify the unique metabolic functional niches filled by core microbial communities in bioaugmented digester microbiota. Enhanced bioconversion of lignocellulosic biomass into methane can considerably contribute to the Sustainable Development Goals by addressing affordable and clean energy production. This review emphasizes the significance of lignocellulolytic microbiotas in bioaugmentation of anaerobic digestion and the understanding of their ecological functions in the intricate interspecies nexus during biomethanation.

URL: https://www.sciencedirect.com/science/article/pii/S1364032124006397?via%3Dihub

SCHOLARLY PUBLICATIONS
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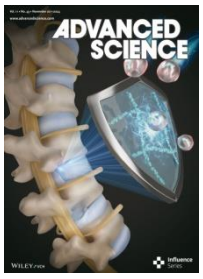
Journal Name: Advanced Science **IF: 14.3**

Title: Inactivation of Pseudovirus Expressing the D614G Spike Protein Mutation using Nitric Oxide-Plasma Activated Water

Author: Patel P., Kaushik N., Acharya T.R., Lenka S.S., Ghosh S., Wahab R., Verma S.K., Choi E.H., Kaushik N.K.

Details: November 2024

Abstract: Variants of concern (VOCs) of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) exhibit high infectivity due to mutations, particularly in the spike protein, that facilitate enhanced binding of virus to human angiotensin-converting enzyme 2 (hACE2). The D614G mutation, situated in S1-domain, promotes the open conformation of spike protein, augmenting its interaction with hACE2. Activated water neutralizes pathogens by damaging biological molecules; however, its effect on mutated SARS-CoV-2 or VOCs requires further exploration. Here, the efficacy of nitric oxide (NO_x)-plasma activated water (PAW) in inhibiting infections by SARS-CoV-2 pseudovirus expressing D614G-mutated spike protein is investigated, which serves as a model for mutated SARS-CoV-2. Results demonstrated high prevalence of D614G mutation in SARS-CoV-2 and its VOCs. NO_x-PAW is non-toxic to cells at high concentration, inhibiting infection by 71%. Moreover, NO_x-PAW induced structural changes in S1-domain of spike protein, reducing its binding affinity and lowering clathrin-mediated endocytosis-related gene expression. Additionally, in silico analysis revealed NO_x species in NO_x-PAW played key role in impairing S1-domain function of the mutated SARS-CoV-2 pseudovirus by interacting directly with it. Collectively, these findings reveal the potent inactivation ability of PAW against mutated SARS-CoV-2 and suggest its potential application in combating emerging variants of SARS-CoV-2 and other viral threats.



URL: https://onlinelibrary.wiley.com/doi/10.1002/advs.202411515

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

Title: Intensifying inactivation strategies: Insights into the role of ultrasound on the inactivation of antibiotic resistant Acinetobacter baumannii via Photo-Fenton reaction

Author: Pranjal; Mahapatra, GC; Chakrabortty, S; Banerjee, S; Chowdhury, S; Khan, MA; Kumar, R; Jeon, BH; Mishra, A; Lundborg, CS; Tripathy, SK

Details: Volume 497, October 2024

Abstract: Improvisation of the contemporary water treatment technologies is critical not only to prevent water borne diseases but also to augment the available water sources. Here, a systematic study is effectuated to comprehend the upswing in the inactivation efficiency of Photo-Fenton (PF) chemistry induced by ultrasound (US) against antibiotic resistant (ABR) Acinetobacter baumannii (A. baumannii). Inactivation of A. baumannii (≈5×106 CFU/mL) was noticed within 75 and 105 min of US assisted PF (SPF) and PF processes respectively using 20 mg/L of H2O2 and 2 mg/L of Fe2+. It was interesting to notice that the PF reaction was effective under weak acidic condition (pH=3 and 5.5) whereas SPF process was realized over a wide pH range (3, 5.5, 7 and 9). No reactivation of the bacteria was found in both the processes till 96 h suggesting the impairment of not only the bacterial cell membrane but also the intracellular components. Experimental results although has suggested the generation of several reactive oxygen species (ROS), the inactivation mechanism was suggested to be dominated by the H2O2 and •OH. The damage caused to the bacterial cell membranes by the synergistic role of US and ROS was observed in the electron microscopy images. Comparative transcriptomic analysis has indicated the upregulation of genes regulating the LPS assembly proteins (Lpt A, B, C) and Pls B, Pgs A and Pal genes regulating the phospholipid synthesis which are known to regulate the stress induced response in bacteria. The SPF process was further validated with real water samples and the treated water was not found to have remarkable toxic effect on the in-vivo animal which endorse its candidature for future applications.

URL: https://www.sciencedirect.com/science/article/abs/pii/S1385894724061618?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **ACS Applied Materials and Interfaces** **IF: 8.5**

Title: Emissive Lipid Nanoparticles as Biophotonic Contrast Agent for Site-Selective Solid Tumor Imaging in Pre-Clinical Models

Author: Prasad R.; Kumari R.; Chaudhari R.; Kumar R.; Kundu G.C.; Kumari S.; Roy G.; Gorain M.; Chandra P.

Details: Volume 16, Issue 40, October 2024

Abstract: Small organic dye-based fluorescent agents are highly potent in solid tumor imaging but face challenges such as poor photostability, nonspecific distribution, low circulation, and weak tumor binding. Nanocarriers overcome these issues with better physicochemical and biological performance, particularly in cancer imaging. Among the various nanosized carriers, lipid formulations are clinically approved but yet to be designed as bright nanocontrast agents for solid tumor diagnosis without affecting surrounding tissues. Herein, indocyanine green (ICG) encapsulated targetable lipid nanoparticles (698 ICG/LNPs) as safe contrast agents (~200 nm) have been developed and tested for solid tumor imaging and biodistribution. Our findings reveal that nanoprecipitation produces ICG-LNPs with a unique assembly, which contributes to their high brightness with improved quantum yield (3.5%) in aqueous media. The bright, optically stable (30 days) biophotonic agents demonstrate rapid accumulation (within 1 h) and prolonged retention (for up to 168 h) at the primary tumor site, with better signal intensity following a one-time dose administration (17.7×10^9 LNP per dose). Incorporated folic acid (735 folic acid/LNPs) helps in selective tumor binding and the specific biodistribution of intravenously injected nanoparticles without affecting healthy tissues. Designed targetable ICG-LNP (634 MESF) demonstrates high-contrast fluorescence and resolution from the tumor area as compared to the targetable ICG-liposomal nanoparticles (532 MESF). Various in vitro and in vivo findings reveal that the cancer diagnostic efficacy elicited by designed bright lipid nanoparticles are comparable to reported clinically accepted imaging agents. Thus, such LNPs hold translational potential for cancer diagnosis at an early stage.

URL: https://pubs.acs.org/doi/10.1021/acsami.4c08273

SCHOLARLY PUBLICATIONS
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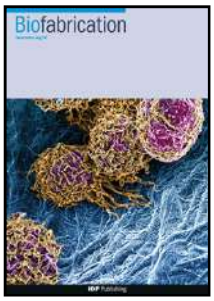
Journal Name: Biofabrication **IF: 8.2**

Title: Biofabricated nanomaterials in sustainable agriculture: insights, challenges and prospects.

Author: Mohanty P.; Singh P.K.; Lenka B.; Adhya T.K.; Verma S.K.; Ayreen Z.; Patro S.; Sarkar B.; Mohapatra R.K.; Mishra S.

Details: Volume 16, Issue 41, October 2024, Article No. 042003.

Abstract: One ever-evolving and ever-demanding critical human endeavour is the provision of food security for the growing world population. This can be done by adopting sustainable agriculture through horizontal (expanding the arable land area) and vertical (intensifying agriculture through sound technological approaches) interventions. Customized formulated nanomaterials have numerous advantages. With their specialized physico-chemical properties, some nanoparticulated materials improve the plant's natural development and stress tolerance and some others are good nanocarriers. Nanocarriers in agriculture often coat chemicals to form composites having utilities with crop productivity enhancement abilities, environmental management (such as ecotoxicity reduction ability) and biomedicines (such as the ability to control and target the release of useful nanoscale drugs). Ag, Fe, Zn, TiO2, ZnO, SiO2 and MgO nanoparticles (NPs), often employed in advanced agriculture, are covered here. Some NPs used for various extended purposes in modern farming practices, including disease diagnostics and seed treatment are also covered. Thus, nanotechnology has revolutionized agrotechnology, which holds promise to transform agricultural (ecosystems as a whole to ensure food security in the future. Considering the available literature, this article further probes the emergent regulatory issues governing the synthesis and use of nanomaterials in the agriculture sector. If applied responsibly, nanomaterials could help improve soil health. This article provides an overview of the nanomaterials used in the distribution of biomolecules, to aid in devising a safer and eco-friendly sustainable agriculture strategy. Through this, agri-systems that depend on advanced farming practices might function more effectively and enhance agri-productivity to meet the food demand of the rising world population.



URL: https://iopscience.iop.org/article/10.1088/1758-5090/ad60f7

SCHOLARLY PUBLICATIONS
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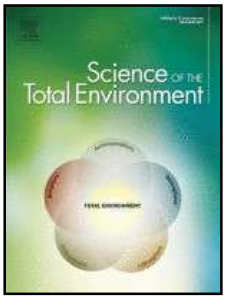
Journal Name: Science of the Total Environment **IF: 8.2**

Title: Controlled in vivo intrinsic detrimental effect of D-Limonene channelized by influential proximal interaction through apoptosis and steatosis in embryonic zebrafish (Danio rerio).

Author: Choudhury A.; Lenka S.S.; Gupta A.; Mandal D.; Sinha A.; Saha U.; Naser S.S.; Singh D.; Simnani F.Z.; Ghosh A.; Kumari S.; Kirti A.; Parija T.; Chauhan R.S.; Kaushik N.K.; Suar M.; Verma S.K.

Details: Volume 949, 1 November 2024, Article No. 175243.

Abstract: Bioaccumulation of d-Limonene in environment due to the aggrandised usage of their natural sources like citrus food wastes and industrial day to day life products has raised concern to their biotoxicity to environment biotic health. Moreover, their after-usage discharge to aquatic system has enhanced the distress of posing threat and needs attention. This study entails mechanistic and molecular evaluation of in-vivo biotoxicity of d-Limonene in zebrafish embryo models. Experimental analysis excavated the controlled concentration-dependent morphological, physiological and cellular in-vivo impact of d-Limonene in zebrafish embryos through significant changes in oxidative stress, steatosis and apoptosis regulated via 6-fold and 5-fold mRNA expression change in p53 and Sod1 genes. Computational evaluation deduced the cellular mechanism of d-limonene biotoxicity as irregularities in oxidative stress, apoptosis and steatosis due of their intrinsic interaction with metabolic proteins like Zhe1a (−4.8 Kcal/mol), Sod1(−5.3 Kcal/mol), p53, caspase3 and apoa1 leading to influential change in structural and functional integrity of the metabolic proteins. The study unravelled the measured in-vivo biotoxicity of d-Limonene at cellular and molecular level to advocate the controlled usage of d-Limonene related natural and industrial product for a sustainable environmental health.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0048969724053932?via%3Dihub

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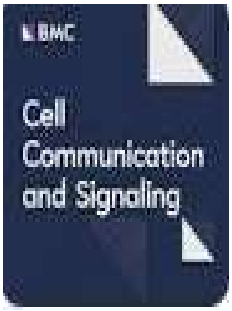
Journal Name: **Cell Communication and Signaling** **IF: 8.2**

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

Journal Name: Cell Communication and Signaling **IF: 8.2**

Title: PIM1 kinase and its diverse substrate in solid tumors

Author: Choudhury R.; Bahadi C.K.; Ray I.P.; Dash P.; Pattanaik I.; Mishra S.; Mohapatra S.R.; Patnaik S.; Nikhil K.

Details: Volume 12, Issue 1, December, 2024

Abstract: The PIM kinase family, consisting of PIM1, PIM2, and PIM3, is a group of serine/threonine protein kinases crucial for cellular growth, immunoregulation, and oncogenesis. PIM1 kinase is often overexpressed in solid and hematopoietic malignancies, promoting cell survival, proliferation, migration, and senescence by activating key genes. In vitro and in vivo studies have established the oncogenic potential of PIM1 kinases. These kinases have been implicated in tumor progression, metastasis, and resistance to chemotherapy, underscoring their potential as a therapeutic target for cancer therapy. This review delves into the intricate molecular mechanisms through which PIM1 interacts with specific substrates in different tumor tissues, leading to diverse outcomes in various human cancers. Over the past decade, the inhibition of PIM1 in cancers has garnered significant attention as a potential standalone treatment. Various in vitro, in vivo, and early clinical trial data have provided support for this approach to varying extents. Novel compounds that inhibit PIM1 kinase have shown effectiveness and a favorable toxicity profile in preclinical studies. Several of these substances are now being studied in clinical trials due to their promising outcomes. This article provides a thorough examination of the PIM1 kinase pathways and the recent advancements in producing PIM1 kinase inhibitors for the treatment of cancer.

URL: https://biosignaling.biomedcentral.com/articles/10.1186/s12964-024-01898-y

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

Title: Mitigating CYP3A4-mediated aflatoxin toxicity with algal-derived Sodium Copper Chlorophyllin: Production and In-silico insights

Author: Mishra M.; Gupta D.; Preeti; Deb D.

Details: Volume 280, Issue 1, November 2024

Abstract: The present research explores the cytotoxic mechanism of protein Cytochrome P450 (CYP3A4) with aflatoxin (AFB1), a potent carcinogen. Cytochrome P450 is an essential enzyme involved in drug metabolism, however epoxide formation due to the binding event of AFB1 leads to cell cytotoxicity. In this direction, our study elucidates the scavenging effect of algal-derived Sodium Copper Chlorophyllin (SCC) over AFB1 cytotoxicity. Cyanobacteria/ microalgae-derived SCC have garnered attention due to its diverse applications in pharmacological and food industries. This work began with the production of SCC from *Spirulina* and *Chlorella* sp. over a stipulated period of growth. Subsequently, the study delved into the interplay between SCC and the carcinogenic impact of AFB1 on the CYP3A4 enzyme. Computational studies demonstrated SCC binding and blocking mechanisms against AFB1. Our research intended to determine whether CYP3A4 can bind to SCC that, in turn, act as an interceptor for AFB1 or influence the metabolism of bound AFB1. Current results support that SCC is an effective AFB1 trap as it shows interactions with AFB1. These findings would open up new avenues in clinical biology/pharmacology to further explore the mechanisms of action of CYP3A4 with AFB1 and SCC, offering promising prospects for abating cell cytotoxicity.

URL: https://www.sciencedirect.com/science/article/abs/pii/S014181302406402X

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

Title: In silico analysis shows slc1a4 as a potential target of hsa-mir-133a for regulating glutamine metabolism in gastric cancer

Author: Chakraborty A., Patnaik J., Sinha A., Parida N., Parija T., Patnaik S.

Details: Volume 282, December, 2024

Abstract: Cutting-edge research has spotlighted glutamine metabolism as a promising therapeutic target in managing gastric cancer. This investigation highlights the upregulated glutamine transporters by leveraging clinical data from the TCGA Database and the expression analysis of the transcriptome profile of stomach adenocarcinoma (STAD) patients. Notably, it identifies SLC1A4 as a potential glutamine transporter in STAD. The screening of human miRNAs conducted using the TargetScan database, and the subsequent docking analysis present multiple miRNAs with the potential of being explored as therapeutic agents. By integrating transcriptome profiling, miRNA screening, and molecular docking, this study reveals, for the first time, the potential of hsa-mir-133a-1 in targeting slc1a4, along with its known target mTOR, in stomach cancer. The myriad interactions that can be regulated by this silencing mechanism are anticipated to ultimately reduce glutamine uptake in STAD. This study provides compelling evidence of glutamine transport via SLC1A4 in stomach cancer and delves into how it might impact mTOR and some of its pivotal downstream molecules. Considering these findings, novel therapeutic strategies can be devised to further enhance existing methods for combating gastric cancer.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0141813024077833?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

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

Title: Biophysical translational paradigm of polymeric nanoparticle: Embarked advancement to brain tumor therapy

Author: Naser SS, Gupta A, Choudhury A, Yadav A, Sinha A, Kirti A, Singh D, Kujawska M, Kaushik NK, Ghosh A, De S, Verma SK.

Details: Volume 17, 9 October 2024, Article number 117372

Abstract: Polymeric nanoparticles have emerged as promising contenders for addressing the intricate challenges encountered in brain tumor therapy due to their distinctive attributes, including adjustable size, biocompatibility, and controlled drug release kinetics. This review comprehensively delves into the latest developments in synthesizing, characterizing, and applying polymeric nanoparticles explicitly tailored for brain tumor therapy. Various synthesis methodologies, such as emulsion polymerization, nanoprecipitation, and template-assisted fabrication, are scrutinized within the context of brain tumor targeting, elucidating their advantages and limitations concerning traversing the blood-brain barrier. Furthermore, strategies pertaining to surface modification and functionalization are expounded upon to augment the stability, biocompatibility, and targeting prowess of polymeric nanoparticles amidst the intricate milieu of the brain microenvironment. Characterization techniques encompassing dynamic light scattering, transmission electron microscopy, and spectroscopic methods are scrutinized to evaluate the physicochemical attributes of polymeric nanoparticles engineered for brain tumor therapy. Moreover, a comprehensive exploration of the manifold applications of polymeric nanoparticles encompassing drug delivery, gene therapy, imaging, and combination therapies for brain tumours is undertaken. Special emphasis is placed on the encapsulation of diverse therapeutics within polymeric nanoparticles, thereby shielding them from degradation and enabling precise targeting within the brain. Additionally, recent advancements in stimuli-responsive and multifunctional polymeric nanoparticles are probed for their potential in personalized medicine and theranostics tailored for brain tumours.

URL: https://www.sciencedirect.com/science/article/pii/S0753332224012575?via%3Dihub

SCHOLARLY PUBLICATIONS
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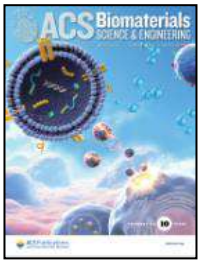
Journal Name: **ACS Biomaterials Science and Engineering** **IF: 5.5**

Title: Engineered PLGA Core-Lipid Shell Hybrid Nanocarriers Improve the Efficacy and Safety of Irinotecan to Combat Colon Cancer

Author: Giram P.S.; Nimma R.; Bulbule A.; Yadav A.S.; Gorain M.; Venkata Radharani N.N.; Kundu G.C.; Garnaik B.

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 microenvironmental 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://pubs.acs.org/doi/10.1021/acsbiomaterials.4c01260

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Life Sciences** **IF: 5.2**

Title: ALDH and cancer stem cells: Pathways, challenges, and future directions in targeted therapy

Author: Lavudi K, Nuguri SM, Pandey P, Kokkanti RR, Wang QE.

Details: Volume 356, 1 November 2024, Article Number 123033

Abstract: Human ALDH comprise 19 subfamilies in which ALDH1A1, ALDH1A3, ALDH3A1, ALDH5A1, ALDH7A1, and ALDH18A1 are implicated in CSC. Studies have shown that ALDH can also be involved in drug resistance and standard chemotherapy regimens are ineffective in treating patients at the stage of disease recurrence. Existing chemotherapeutic drugs eliminate the bulk of tumors but are usually not effective against CSC which express ALDH+ population. Henceforth, targeting ALDH is convincing to treat the patient's post-relapse. Combination therapies that interlink signaling mechanisms seem promising to increase the overall disease-free survival rate. Therefore, targeting ALDH through ALDH inhibitors along with immunotherapies may create a novel platform for translational research. This review aims to fill in the gap between ALDH1 family members in relation to its cell signaling mechanisms, highlighting their potential as molecular targets to sensitize recurrent tumors and bring forward the future development concerning the current progress and draw backs. This review summarizes the role of cancer stem cells and their upregulation by maintaining the tumor microenvironment in which ALDH is specifically highlighted. It discusses the regulation of ALDH family proteins and the crosstalk between ALDH and CSC in relation to cancer metabolism. Furthermore, it establishes the correlation between ALDH involved signaling mechanisms and their specific targeted inhibitors, as well as their functional modularity, bioavailability, and mechanistic role in various cancers.

URL: https://www.sciencedirect.com/science/article/pii/S0024320524006234?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: Food Bioscience **IF: 4.8**

Title: Simultaneous folate fortification and pesticide residue degradation in finger millet (Eleusine coracana) via malting and Lactiplantibacillus plantarum-mediated fermentation

Author: Nayak P.P., Das R.P., Mahanta S.K., Singh A., Dhal A.K., Mahapatra R.K., Goswami L., Ray L., Behera S.K., Buys E.M., Panda S.K.

Details: Volume 62, December, 2024

Abstract: In the current study, finger millets (Eleusine coracana) served as the raw material to assess the impacts of malting and Lactiplantibacillus plantarum-mediated fermentation. Post-fermentation analysis revealed a substantial elevation in the concentration of 5-methyltetrahdrofolate (5-MTHF) (bioactive form of folate) in the fermented samples, UM-F (unmalted and fermented) and M-F (malted and fermented) with 137.28 and 147.84 μg/100g, respectively. Furthermore, malting followed by fermentation collectively reduced the spiked pesticides, lindane, and chlorpyrifos from the original concentration of 330.83 ppb and 295.12 ppb in the UM-UF (unmalted and unfermented) samples to 44.44 ppb (86.53% decrease) and 12.13 ppb (95.88% decrease), respectively. In silico investigation envisaged the role of two enzymes, alcohol dehydrogenase and alkaline phosphatase of L. plantarum in the disintegration of lindane and chlorpyrifos, respectively which was subsequently validated by quantifying the enzymes in the fermentation medium (alkaline phosphatase obtained in M-F was 1.60 U/mL and the alcohol dehydrogenase produced was 44.02 U/mg protein). Biochemical analyses, thermal gravimetric analysis, infrared spectroscopy, and X-ray diffraction studies reported significant transformations among the samples, UM-UF, UM-F, M-UF (malted and unfermented millet), and M-F, which indicates the role of malting and fermentation and the enzymes involved in the processes.

URL: https://www.sciencedirect.com/science/article/abs/pii/S2212429224018601?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: Food Bioscience **IF: 4.8**

Title: Analysis of nutritional value, antiviral potential and in vivo toxicological evaluation of Termitomyces clypeatus R. Hiem mycelial extract, a wild edible mushroom.

Author: Khumlianlal J.; Rajkumari J.; Keshry S.S.; Jena S.; Chattopadhyay S.; Mukherjee P.K.; Sarangthem I.

Details: Volume 61, October 2024, Article No. 104817.

Abstract: The wild edible mushroom, Termitomyces has been employed in traditional medicine by various indigenous communities throughout Asia and Africa. In India, the Santal tribe used it to treat pox while the Mokokchung people used it for abdominal discomfort, cough and whooping cough. However, to date, the antiviral activity of Termitomyces has not been evaluated. Thus, the nutritional value, chemical composition and antiviral potential of Termitomyces clypeatus were investigated. Further, the in vivo oral toxicity of the mushroom extract was assessed in BALB/c mice. The proximate composition analysis indicated a high protein, crude fibre, carbohydrate and mineral content. Bioactive metabolites including Sphinganine, Burseran and Melleolide were also detected in the mushroom extract. For the first time, the anti-antiviral property of Termitomyces clypeatus (100µg/mL) with 95.74% ± 4.01% and 87.13% ± 3.61% inhibition in viral copy number of CHIKV and SARS-CoV-2, respectively was documented. The in vivo acute and sub-acute toxicity study using BALB/c mice revealed no clinical signs of toxicity on oral administration of the mushroom extract. These findings offer the scientific rationale for the possible safe use of Termitomyces clypeatus as a functional food in managing RNA viruses, CHIKV and SARS-CoV-2.

URL: https://www.sciencedirect.com/science/article/abs/pii/S2212429224012471?via%3Dihub

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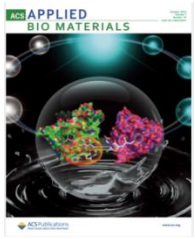
Journal Name: ACS Applied Bio Materials **IF: 4.7**

Title: Cytocompatible Hyperbranched Polyesters Capable of Altering the Ca2+ Signaling in Neuronal Cells In Vitro

Author: Sarkar R., Chatterjee R., Dutta S., Kumar S., Kumar S., Goswami C., Goswami L., Pal S., Bandyopadhyay A.

Details: Volume 7, Issue 10, Pages 6682 – 669521, October 2024

Abstract: Synthetic hyperbranched polyesters with potential therapeutic properties were synthesized using the bifunctional polyethylene glycol or PEG with different molecular weights, ca., 4000, 6000, and 20,000 g/mol, and the trifunctional trans-aconitic acid or TAA. During polycondensation, a fixed amount of PEG was allowed to react with varying amounts of TAA (1:1 and 1:3) to control the branching extents. It was found that the synthetic polyesters had a considerable yield and were highly water soluble. Spectroscopic data (Fourier transform infrared and ^{1}H NMR) confirmed the polyester formation; the branching percentages were determined from ^{1}H NMR spectroscopy which varied from 73% to 22% among the synthesized samples. As the molecular weight of PEG was increased, the branching percentage drastically dropped. All polyesters were found to be negatively charged due to the ionization of unreacted -COOH in the branched ends at the working pH (7.4). Both the hydrodynamic size and intrinsic viscosity were found to reduce as the branching extent increased. Among the sets of polyesters, the one with the highest branching percentage (73%) showed the core-shell morphology (evident from field emission scanning electron microscopy and transmission electron microscopy studies). It also exhibited the highest efficiency toward Ca^{2+} influx in neuronal cells due to the unique morphology and the negatively charged surface. Nevertheless, this particular grade of polyester along with all the other grades was cytocompatible and induced reactive oxygen species generation. Since the maximally branched grade was highly efficient in altering the Ca^{2+} signaling through stronger influx, it may well be tested for treating neuronal disorders in vivo in future.



URL: https://pubs.acs.org/doi/10.1021/acsabm.4c00848

SCHOLARLY PUBLICATIONS
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Journal Name: Cancers **IF: 4.5**

Title: Targeted Therapy in Breast Cancer: Advantages and Advancements of Antibodyâ€“Drug Conjugates, a Type of Chemo-Biologic Hybrid Drugs

Author: Mukherjee A.; Bandyopadhyay D.

Details: Volume 16, Issue 20, October, 2024

Abstract: Cancer is a significant health challenge globally, with millions of people affected every year, resulting in high morbidity and mortality. Although other treatment options are available with limitations, chemotherapy, either standalone or combined with other therapeutic procedures, is the most commonly used practice of treating cancer. In chemotherapy, cancer cells/malignant tumors are targeted; however, due to less target specificity, along with malignant cells, normal cells are also affected, which leads to various off-target effects (side effects) that impact the patient quality of life. Out of all the different types of cancers, breast cancer is the most common type of cancer in humans worldwide. Current anticancer drug discovery research aims to develop therapeutics with higher potency and lower toxicity, which is only possible through target-specific therapy. Antibody–drug conjugates (ADCs) are explicitly designed to target malignant tumors and minimize off-target effects by reducing systemic cytotoxicity. Several ADCs have been approved for clinical use and have shown moderate to good efficacy so far. Considering various aspects, chemotherapy and ADCs are useful in treating cancer. However, ADCs provide a more focused and less toxic approach, which is especially helpful in cases where resistance to chemotherapy (drug resistance) occurs and in the type of malignancies in which specific antigens are overexpressed. Ongoing ADC research aims to develop more target-specific cancer treatments. In short, this study presents a concise overview of ADCs specific to breast cancer treatment. This study provides insight into the classifications, mechanisms of action, structural aspects, and clinical trial phases (current status) of these chemo-biologic drugs (ADCs).

URL: https://www.mdpi.com/2072-6694/16/20/3517

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Journal Name: **Bioorganic Chemistry** **IF: 4.5**

Title: Scaffold overlay of flavonoid-inspired molecules: Discovery of 2,3-diaryl-pyridopyrimidin-4-imine/ones as dual hTopo-II and tubulin targeting anticancer agents

Author: Saini M.; Paul S.; Acharya A.; Acharya S.S.; Kundu C.N.; Guchhait S.K.

Details: Volume 152, November 2024

Abstract: Almost half of all medicines approved by the U.S. Food and Drug Administration have been found to be developed based on inspiration from natural products (NPs). Here, we report a novel strategy of scaffold overlaying of scaffold-hopped analogs of bioactive flavones and isoflavones and installation of drug-privileged motifs, which has led to discovery of anticancer agents that surpass the functional efficiency of the original NPs. The analogs, 2,3-diaryl-pyridopyrimidin-4-imine/ones were efficiently synthesized by an approach of a nitrile-stabilized quaternary ammonium ylide as masked synthon and Pd-catalyzed activation–arylation methods. Compared to the NPs, these NP-analogs exhibited differentiated functions; dual inhibition of human topoisomerase-II (hTopo-II) enzyme and tubulin polymerization, and pronounced antiproliferative effect against various cancer cell lines, including numerous drug-resistant cancer cells. The most active compound 5l displayed significant inhibition of migration ability of cancer cells and blocked G1/S phase transition in cell cycle. Compound 5l caused pronounced effect in expression patterns of various key cell cycle regulatory proteins; up-regulation of apoptotic proteins, Bax, Caspase 3 and p53, and down-regulation of apoptosis-inhibiting proteins, BcL-xL, Cyclin D1, Cyclin E1 and NF-κB, which indicates high efficiency of the molecule 5l in apoptosis-signal axis interfering potential. Cheminformatics analysis revealed that 2,3-diaryl-pyridopyrimidin-4-imine/ones occupy a distinctive drug-relevant chemical space that is seldom represented by natural products and good physicochemical, ADMET and pharmacokinetic-relevant profile. Together, the anticancer potential of the investigated analogs was found to be much more efficient compared to the original natural products and two anticancer drugs, Etoposide (hTopo-II inhibitor) and 5-Flurouracile (5-FU).

URL: https://www.sciencedirect.com/science/article/abs/pii/S0045206824006436?via%3Dihub

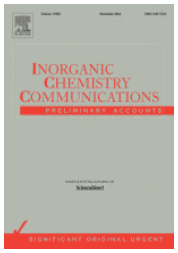
Journal Name: Inorganic Chemistry Communications **IF: 4.4**

Title: Green-synthesized BiFeO3 nanoparticles for efficient photocatalytic degradation of organic dyes, antibiotic and catalytic reduction of 4-nitrophenol

Author: Parida S., Sarangi B., Nanda J., Pany B.

Details: Volume 170, December 2024, Article number 113344

Abstract: Green-synthesized nanoparticles have recently emerged as promising catalysts for the removal of toxic dyes from water bodies. In this article, Bismuth ferrite nanoparticles were synthesized by a simple and low-cost method using Couroupita guianensis plant leaf extract. The particles were used as photocatalysts for degrading RhB, MO dyes, and TC antibiotics, as well as for reducing toxic 4-NP to useful 4-AP. The synthesized nanoparticles were characterized using several state-of-the-art tools. The formation of perovskite structure and the presence of biomolecules on the surface of $BiFeO_3$ nanoparticles were confirmed by FTIR analysis. Raman spectrum revealed a rhombohedral structure of $BiFeO_3$ nanoparticles, corroborating the XRD findings. FESEM micrograph demonstrated irregularly shaped agglomerated nanoparticles. The average hydrodynamic diameter was estimated to be 51 nm using the DLS technique. The optical energy bandgap of the bismuth ferrite was estimated using Tauc's relation for direct bandgap semiconductors. SQUID measurements revealed that these nanoparticles exhibit a weak ferromagnetic ordering. Furthermore, these nanomaterials degraded the cationic and anionic dyes effectively because of the formation of hydroxyl radicals, confirmed by the scavenger test. The photocatalytic degradation pathway of RhB dye was investigated through LC-MS analysis, and the intermediate degradation products were identified. The prepared material also exhibited excellent catalytic reduction efficiency in a short duration of time. This study proclaims that these nanoparticles can be used as potential catalysts for the purification of water bodies.



URL: https://www.sciencedirect.com/science/article/pii/S1387700324013340?via%3Dihub

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Journal Name: Plant Science **IF: 4.2**

Title: A review on ubiquitin ligases: Orchestrators of plant resilience in adversity.

Author: Suranjika, S; Barla, P; Sharma, N; Dey, N

Details: Volume 347, October 2024, Article No. 112180.

Abstract: Ubiquitin- proteasome system (UPS) is universally present in plants and animals, mediating many cellular processes needed for growth and development. Plants constantly defend themselves against endogenous and exogenous stimuli such as hormonal signaling, biotic stresses such as viruses, fungi, nematodes, and abiotic stresses like drought, heat, and salinity by developing complex regulatory mechanisms. Ubiquitination is a regulatory mechanism involving selective elimination and stabilization of regulatory proteins through the UPS system where E3 ligases play a central role; they can bind to the targets in a substrate-specific manner, followed by poly-ubiquitylation, and subsequent protein degradation by 26 S proteasome. Increasing evidence suggests different types of E3 ligases play important roles in plant development and stress adaptation. Herein, we summarize recent advances in understanding the regulatory roles of different E3 ligases and primarily focus on protein ubiquitination in plant–environment interactions. It also highlights the diversity and complexity of these metabolic pathways that enable plant to survive under challenging conditions. This reader-friendly review provides a comprehensive overview of E3 ligases and their substrates associated with abiotic and biotic stresses that could be utilized for future crop improvement.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0168945224002073?via%3Dihub