List of Publications

Articles

- ✓ **Batheja, S.**; Sahoo, R. K.; Rani, S.; Gupta, S.; Tejavath, K. K., Sinha, S.; Ajazuddin; Yadav, A. K.; Goyal, A. K.; Gupta, U. Central Composite Design based Optimization of Carbohydrate Coated Albumin Nanoparticles for HCC: Synthesis, Extensive Characterization and *In vivo* Pharmacokinetic Evaluation. *Biochemical Pharmacology*. [**Impact Factor-5.3**] (under communication).
- ✓ Vaiphei, K. K.; Prabakaran, A.; Sahoo, R. K.; **Batheja, S.**; Gupta, U.; Puri, A.; Roy, U.; Alexander, A. Impact of PEGylated liposomes on cytotoxicity of tamoxifen and piperine on MCF-7 human breast carcinoma cells. *Journal of Drug Delivery Science and Technology*. [**Impact Factor-4.5**] (under communication).
- ✓ Jha, S.; Prabakaran, A.; Sahoo, R. K.; **Batheja, S.**; Gupta, U.; Alexander, A. Antiproliferative activity of syringic acid-loaded nanostructured lipid carriers against MCF-7 human breast carcinoma cells. *Journal of Drug Delivery Science and Technology*, **2024**, *98*, 105902 [**Impact Factor-4.5**].
- ✓ **Batheja, S.**; Gupta, S.; Tejavath, K. K., Gupta, U. TPP-based Conjugates: Potential Targeting Ligands. *Drug Discovery Today*, **2024**, *29*(6), 103983 [**Impact Factor-6.5**].
- ✓ **Batheja, S.**; Sahoo, R. K.; Tarannum, S.; Vaiphei, K. K.; Jha, S.; Alexander, A.; Goyal, A. K.; Gupta, U. Hepatocellular Carcinoma: Preclinical and Clinical Applications of Nanotechnology with the Potential Role of Carbohydrate Receptors. *Biochimica et Biophysica Acta (BBA)-General Subjects.* **2023**, *1867*(10), 130443. [**Impact Factor-2.8**]
- ✓ Sahoo, R. K.; Gupta, T.; **Batheja, S.**; Goyal, A. K.; Gupta, U. Surface Engineered Dendrimers: A Potential Nanocarrier for the Effective Management of Glioblastoma Multiforme. *Current Drug Metabolism*, **2022**, *23*(9), 708-722. [**Impact Factor-2.3**]

Book Chapters

- ✓ SK Khatik, A., Kurdhane, S., **Batheja, S.**; Gupta, U. Dendrimers: Promises Challenges in Drug Delivery. *In* Molecular Pharmaceutics and Nano Drug Delivery. Academic Press, Elsevier, Netherlands. 2023, pp- 237-267. ISBN- 978-0-323-91924-1.
- ✓ **Batheja, S**.; Remya, Kumar, V.; Sahoo, R. K.; Gupta, U. Drug Delivery to Central Nervous System. *In* Controlled and Novel Drug Delivery. 2nd Edition, *Edited by* N.K. Jain. CBS Publishers & Distributors, Delhi. Aug, 2023, pp- 265-295. ISBN (print)-978-93-5466-695-7.
- ✓ Ramteke, U.; Kumar, V.; **Batheja, S.**; Phulmogare, G.; Gupta, U. Functionalized Mesoporous Silica Based Nanoparticles for Theranostic Applications. *In* Multifunctional and Targeted Theranostic Nanomedicines. Edited by Keerti Jain and N.K. Jain. Springer Nature, Switzerland. Aug, 2023, pp-383-417. ISBN (print) - 978-981-99-0537-9.
- ✓ Sahoo, R. K.; Kumar, V.; **Batheja, S.**; Gupta, U. Dendrimers in the Effective Management of Alzheimer's and Dementia. *In* Nanomedicine-Based Approaches for the Treatment of Dementia. Academic Press, Elsevier, Netherlands. Nov, 2022, pp-71-88. ISBN-978-0-12-824331-2.

- ✓ Kumar, V.; Singh, H.; Tarannum, S.; **Batheja, S.**; Gupta, U.; Goyal, A.K. Nanostructure based Pulmonary Drug Delivery System for Respiratory Infection. *In* Nanomedicine, Nanotheranostics and Nanobiotechnology: Fundamentals and Applications. CRC Press, Taylor & Francis Group, USA. Nov, 2020 (under communication).

Signature
(Sanya Batheja)

ELSEVIER

KEYNOTE (GREEN)

TPP-based conjugates: potential targeting ligands

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Mitochondria are one of the major sources of energy as well as regulators of cancer cell metabolism. Thus, they are potential targets for the effective treatment and management of cancer. Research has explored triphenylphosphonium (TPP) derivatives as potent cancer-targeting ligands because of their lipophilic nature and mitochondrial affinity. In this review, we summarize the utility of TPP-based conjugates targeting mitochondria in different types of cancer and other diseases, such as neurodegenerative and cardiovascular disorders. Such conjugates offer versatile therapeutic potential by modulating membrane potential, influencing reactive oxygen species (ROS) production, and coupling of molecular modifications (such as ATP metabolism and energy metabolism). Thus, we highlight TPP conjugates as promising mitochondria-targeting agents for use in targeted drug delivery systems.

Sanya Batheja is pursuing doctoral studies in the Nanopolymeric Drug Delivery Lab, Department of Pharmacy, Central University of Rajasthan (CURAJ). She is NTA-GPAT and CUET qualified. She received her M. Pharm from the Central University of Rajasthan, India under the supervision of Amit K. Goyal, co-supervised by Umesh Gupta. Her research interests include conjugation chemistry and nanoparticulate drug delivery.

Shruti Gupta received a BSc in Botany from Utkal University, Odisha in 2016 and an MSc in biochemistry from CURAJ in 2018. Her MSc work focused on dye degradation techniques using nanoparticles in aqueous medium. Later, she worked as a project fellow, where her research involved synthesizing mono and bimetallic nanoparticles as therapy options for various cancers. In 2019, she started her PhD in CURAJ under the supervision of Kiran Kumar Tejavath. Her PhD work is based on conjugate synthesis.

Kiran Kumar Tejavath received his PhD in biochemistry from University of Hyderabad (HCU), Hyderabad in 2012, which focused on biologically important proteins from *Moringa oleifera* seeds. He became an assistant professor at CURAJ in 2013. In 2014, he started a research group at CURAJ focusing on biological activities of different metallic and polymeric nanoparticles. In 2019, his research focus changed to searching for therapeutic options in the form of herbal medicines against pancreatic ductal adenocarcinoma. Currently, he has joined Department of Biochemistry, AIIMS, Bibinagar, Hyderabad.

Umesh Gupta is an associate professor at Department of Pharmacy, CURAJ. He was awarded a PhD in pharmaceutical sciences from Dr. H.S. Gour University, India under the mentorship of N.K. Jain. He has also worked as a research scientist at Ranbaxy Research Laboratories, India and as a postdoctoral research associate at South Dakota State University, USA. His research is mainly focused on dendrimer-mediated drug delivery, solubilization, and targeting.

Introduction

As one of the most significant organelles in eukaryotic cells, mitochondria have a distinctive role and structure in lipid-bilayer membranes.[p1] The four distinct components of mitochondrial structure are the matrix, inner mitochondrial membrane (IMM), outer mitochondrial membrane (OMM), and intermembranous space (IMS). Each component has a different permeability; for example, the IMM is selectively permeable,

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Hepatocellular carcinoma: Preclinical and clinical applications of nanotechnology with the potential role of carbohydrate receptors

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ABSTRACT

Hepatocellular carcinoma (HCC) is one of the most common types of liver cancer; accounts for 75–85% of cases. The treatment and management of HCC involve different sanative options like surgery, chemotherapy, immunotherapy, *etc.* Recently, various advancements have been introduced for the diagnosis and targeting of hepatic tumor cells. Among these, biomarkers are considered the primary source for the diagnosis and differentiation of tumor cells. With the advancement in the field of nanotechnology, different types of nanocarriers have been witnessed in tumor targeting. Nanocarriers such as nanoparticles, liposomes, polymeric micelles, nanofibers, *etc.* are readily prepared for effective tumor targeting with minimal side-effects. The emergence of various approaches tends to improve the effectiveness of these nanocarriers as demonstrated in ample clinical trials. This review focuses on the significant role of carbohydrates such as mannose, galactose, fructose, *etc.* in the development, diagnosis, and therapy of HCC. Hence, the current focus of this review is to acknowledge various perspectives regarding the occurrence, diagnosis, treatment, and management of HCC.

1. Introduction

Cancer is the major cause of deaths worldwide. Among various cancers, hepatocellular carcinoma (HCC) is ranked as the fourth most leading cause of cancer-associated deaths. According to GLOBOCAN 2020 factsheet, liver cancer is estimated with 4.3% of new cases which tends to be 905,677 incidences whereas, mortality rate leads by 8.3% accounting 830,180 deaths worldwide [1]. Global demographics represented in the statistical data predict the rate of incidence and prevalence with the hike of about 70% in the next two decades [2]. HCC is one of the most prevailing and cataclysmic form of liver cancer.HCC is a multi-step process which involves assemblage of alterations and mutations in genetic and epigenetic centers culminating the aberrant activation of molecular signaling pathways [3].Various sanative options are available for different stages of HCC such as for the early-stage carcinoma surgical resection, ablations, and transplantation are recommended, whereas, trans-arterial chemoembolisation (TACE) and trans-arterial radioembolisation (TARE) are recommended for intermediate stage of HCC treatment. Certainly, an adequate pharmacological alternative requires established guidelines. However, the pursuit of

Abbreviations: HCC, Hepatocellular carcinoma; HBV, Hepatitis B virus; HCV, Hepatitis C virus; OLT, Orthotopic liver transplantation; RFA, Radiofrequency ablation; NLR, Neutrophil-lymphocyte ratio; TACE, Trans-arterial chemoembolisation; TARE, Trans-arterial radioembolisation; HAI, Hepatic arterial infusion; ROS, Reactive oxygen species; TAMs, Tumor-associated macrophages; MDSCs, Marrow-derived suppressor Cells; TANs, Tumor-associated neutrophils; CAFs, Cancer-associated fibroblasts; AFP, Alpha-fetoprotein; DCP, Des-γ-carboxyprothrombin; PGM5, Phosphoglucomutase-like protein 5; AFU, α-L-fucosidase; GP73, Golgi protein 73; OPN, Osteopontin; MMP2, Matrix metalloproteinase-2; CA19–9, Carbohydrate antigen 19–9; GPC-3, Glypican-3; HSP70, Heat shock protein 70; CK, Cytokeratin; GS, Glutamine synthetase; Arg-1, Arginase-1; TERT, Telomerase reverse transcriptase; PTEN, Phosphatase and tensin homologue deleted on chromosome 10; PI3K, Phosphatidylinositol 3-kinase; MDM2, Murine double minute 2; JAK1, Janus kinase-1; EGFR, Epidermal growth factor receptor; Hep Par-1, Hepatocyte paraffin-1; c-Met, Mesenchymal epithelial transition factor; VEGF, Vascular endothelial growth factor; ADC, Antibody drug conjugate.

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