

Amalendu Ranjan, PhD
Microbiology, Immunology & Genetics
School of Biomedical Sciences
Email: Amalendu.Ranjan@unthsc.edu



Area of Expertise

My research focuses on the development, characterization and application of nanotechnology based drug delivery systems that carry drugs to target sites in the body. The goal is to overcome the various therapeutic barriers using novel nano-platforms for the treatment of cancer and other diseases. My research centers on encapsulating various types of hydrophobic, hydrophilic, and small molecule drugs and imaging agents in nanoparticles and producing lab-scale and large-scale batches.

The three main areas of my research include:

- 1) Biomimetic drug delivery systems: bio-mimicking natures created by covering a polymeric nanoparticle with a cellular membrane extracted directly from cells;
- 2) Polymeric based nanoparticles: including the synthesis of targeted and non-targeted PLGA based nanoparticles. The targeting molecules such as peptides or antibodies may be attached using a linker which is either non-covalent or covalent to the polymeric or lipid surface using surface chemistry;
- 3) Curcumin Nano therapeutics: we have developed various nanoformulations using curcumin and are actively working to improve these nanoformulations to provide an effective way to deliver this drug.

Qualifications

BS in Chemical Engineering, Birsa Institute of Tech-Sindri

MTech in Chemical Engineering, IIT Bombay

PhD in Biochemical Engineering, IIT Delhi

Recent Publications

Novel Use of Hypoxia-Inducible Polymerizable Protein to Augment Chemotherapy for Pancreatic Cancer

Gdowski, A., Hayatshahi, H., Fudala, R., Joshi, R., Liu, J., Vishwanatha, J. K., Jeyarajah, R., Guzik, P. & Ranjan, A. P., Jan 2022, In: *Pharmaceutics*. 14, 1, 128.

Bioinspired Nanoparticles Engineered for Enhanced Delivery to the Bone

Gdowski, A. S., Lampe, J. B., Lin, V. J. T., Joshi, R., Wang, Y. C., Mukerjee, A., Vishwanatha, J. K. & Ranjan, A. P., 25 Oct 2019, In: *ACS Applied Nano Materials*. 2, 10, p. 6249-6257 9 p.

In vivo imaging and biodistribution of near infrared dye loaded brain-metastatic-breast-cancer-cell-membrane coated polymeric nanoparticles

Kumar, P., Treuren, T. V., Ranjan, A. P., Chaudhary, P. & Vishwanatha, J. K., 15 Apr 2019, In: *Nanotechnology*. 30, 26, 265101.

Investigational agents to enhance the efficacy of chemotherapy or radiation in pancreatic cancer

Hurtado, M., Sankpal, U. T., Ranjan, A., Maram, R., Vishwanatha, J. K., Nagaraju, G. P., El-Rayes, B. F. & Basha, R., Jun 2018, In: *Critical Reviews in Oncology/Hematology*. 126, p. 201-207 7 p.

Optimization and scale up of microfluidic nanolipomer production method for preclinical and potential clinical trials

Gdowski, A., Johnson, K., Shah, S., Gryczynski, I., Vishwanatha, J. & Ranjan, A., 12 Feb 2018, In: *Journal of Nanobiotechnology*. 16, 1, 12.

"Curcumin-loaded Poly (D, L-lactide-co-glycolide) nanovesicles induce antinociceptive effects and reduce pronociceptive cytokine and BDNF release in spinal cord after acute administration in mice"

Pieretti, S., Ranjan, A. P., Di Giannuario, A., Mukerjee, A., Marzoli, F., Di Giovannandrea, R. & Vishwanatha, J. K., 1 Oct 2017, In: *Colloids and Surfaces B: Biointerfaces*. 158, p. 379-386 8 p.

Bone-targeted cabazitaxel nanoparticles for metastatic prostate cancer skeletal lesions and pain

Gdowski, A. S., Ranjan, A., Sarker, M. R. & Vishwanatha, J. K., Sep 2017, In: Nanomedicine. 12, 17, p. 2083-2095 13 p.

Current concepts in bone metastasis, contemporary therapeutic strategies and ongoing clinical trials

Gdowski, A. S., Ranjan, A. & Vishwanatha, J. K., 2017, In: Journal of Experimental and Clinical Cancer Research. 36, 1, 108.

Targeted nanocurcumin therapy using annexin A2 antibody improves tumor accumulation and therapeutic efficacy against highly metastatic breast cancer

Mukerjee, A., Ranjan, A. P. & Vishwanatha, J. K., Jul 2016, In: Journal of Biomedical Nanotechnology. 12, 7, p. 1374-1392 19 p.

Curcumin-ER prolonged subcutaneous delivery for the treatment of non-small cell lung cancer

Ranjan, A. P., Mukerjee, A., Gdowski, A., Helson, L., Bouchard, A., Majeed, M. & Vishwanatha, J. K., Apr 2016, In: Journal of Biomedical Nanotechnology. 12, 4, p. 679-688 10 p.

Sponsored Projects

Anti-Neuropilin Conjugated Theranostic Hybrid Nanoparticles Co-Encapsulating Curcumin and Methylene Blue for Combinatorial Therapy of Glioblastoma

Ranjan, A. & Yang, S.

Intramural Research(UNTHSC)

1/09/13 → 31/08/15

Molecular Beacon-Based Nanoparticles for TNBC Imaging and Targeted Therapy

Vishwanatha, J., Gryczynski, Z. & Ranjan, A.

NCI: National Cancer Institute

19/02/15 → 31/01/18

Nano-G: Rescuing grepafloxacin by Mitigating its QT Prolongation for Faster Clinical Translation

Ranjan, A. & Simecka, J.

Intramural Research(UNTHSC)

1/06/17 → 31/05/18

NRMNet: A national resource for mentorship and networking to enhance diversity

Vishwanatha, J. & Ranjan, A.

NIMHD: Natl Institute on Minority Health

1/07/19 → 30/06/24

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NIGMS: General Medical Sciences

1/07/19 → 30/06/24

Studies with Curcumin ER

Vishwanatha, J. & Ranjan, A.

SignPath Pharmaceuticals, Inc.

1/08/13 → 31/01/15

Targeted Multifunctional Lipid-PLGA Hybrid Nanosystems for Metastatic Breast Cancer Imaging and Therapy

Ranjan, A.

Intramural Research(UNTHSC)

14/01/13 → 13/07/14

Texas Center for Minority Health Education, Research and Outreach - Administrative Core

Vishwanatha, J., Jones, H., Chaudhary, P. & Ranjan, A.

NIMHD: Natl Institute on Minority Health

16/07/12 → 31/05/18