

## प्रोफेसर तपस कुमार कुंडू

पीएचडी, डीएससी, एफएनएससी, एफएससी, एफएनए, सर जेसी बोस नेशनल फेलो

निदेशक

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Director

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**Subject:** Citation (summary) of outstanding research work of **Dr Prabhat Ranjan Mishra** for SUN Pharma Research Award-2021 nomination in Pharmaceutical Sciences.

**Dr Mishra** has made innovative contribution in developing bio-functionalized nano-therapeutics and focusing on mechanistic understanding of ligand receptor interactions, endosomal pH responsiveness and receptor mediated endocytosis and its link to nano-therapeutics. He is not only developing targeted nano-therapeutics but also elucidating the mechanism of its uptake to achieve higher therapeutic index with low toxicity of drugs.

In brief, he elucidated Aggregation Induced Emission mechanism demonstrating image-guided chemotherapy through anisamide anchored nano-liquid crystals with enhanced antitumor efficacy (**ACS Appl. Mater. Interfaces** 2018; I.F. 9.23). He also demonstrated that metformin and topotecan can be co-delivered in a synchronized manner using lipid bilayer-camouflaged mesoporous silica nanoparticles that promote apoptosis via mitochondrial membrane depolarization and cell cycle arrest to achieve 100 fold higher drug concentration in tumor (**Adv. Healthcare Mater** 2018 I.F. 9.93). He discovered that, tumor microenvironment can be modulated using Mn<sup>2+</sup> laden theranostic lyotropic liquid crystalline nanostructures without any external stimulus to achieve advanced comprehensive cancer nano-theranostics (**Acta Biomaterialia** 2020 I.F. 8.95) while acylated pyridoxine exerts proton sponge effect when tethered on nanoparticles that helps to escape lysosomal degradation to facilitate intracellular drug release resulting in fifteen-fold reduction in therapeutic dose of doxorubicin with enhanced antitumor efficacy (**ACS Appl. Mater. Interfaces** 2016; I.F. 9.23). He established potential role of pluronylated putrescine and spermine in targeting glypican-1 receptor and cell surface heparan sulfate proteoglycan (HSPG) respectively following receptor mediated endocytosis through nano-constructs for the treatment of metastatic breast cancer (**Biomater. Sci** 2020, I.F. 6.84). He discovered that hyaluronic acid anchored nanocrystals expedites CD44 receptor mediated endocytosis to exhibit reduced lung metastasis and toxicity of paclitaxel while enhancing oral bioavailability through reversible P-gp modulation with significant reduction in tumor growth ensuing patient friendly "chemotherapy at home" (**Acta Biomater.** 2015; I.F. 8.95). He elucidated that redox sensitive micellar system bearing epalrestat and doxorubicin gets disrupted in tumor redox environment through VTC receptor mediated uptake to promote synergistic tumor suppression (**Biomater. Sci.**, 2019; IF 6.84).

Overall, his contributions lies in establishing innovative nano-therapeutics thereby bypassing established biological barriers. He licensed five products to companies while two are successfully commercialized as **Reunion™** and **Joint Fresh™**. In addition, he has been actively involved in developing Umifenovir and its formulation under repurposing for covid patients whose **Phase III clinical trial** has been completed and data is submitted to DCGI for marketing approval.



(Tapas Kumar Kundu)

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