NIPER
RAEBARELI

शुभिनी अ सराफ
एम. फार्म, पीएचडी
निदेशक

Shubhini A Saraf
M. Pharm, PhD
Director

सत्यमेव जयते

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान, रायबरेली
(औषध विभाग, रसायन और उर्वरक मंत्रालय, भारत सरकार)
बिजनौर-सिसेंडी रोड, सीआरपीएफ बेस कैम्प के निकट, सरोजनी नगर,
पोस्ट ऑफिस : माती, लखनऊ–226002

National Institute of Pharmaceutical Education and Research, Raebareli
(Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers, Govt. of India)
Bijnor-Sisendi Road, Near CRPF Base Camp, Sarojini Nagar,
Post Office : Mati, Lucknow (UP)- 226002

Date: 30.07.2024

Subject: Citation (summary) of outstanding research work of **Dr Prabhat Ranjan Mishra** for SUN Pharma Research Award-2024 nomination in Pharmaceutical Sciences.

Dr Mishra has significantly contributed and established a niche area of translational research and actively involved in developing bio-functionalized nano-biomaterials for therapeutics & diagnostic applications and elucidating the mechanistic aspect of its cellular translocation to achieve a higher therapeutic index with the low toxicity of drugs. Major contributions are summarized below:

Knowledge generation and development: In brief, he has discovered that breast cancer cell derived exosomes facilitates receptor mediated fusion & intracellular trafficking of quantum dots resulting spatial targeting to tumors at significantly lower dose ***(J. Controlled Rel 2024; I.F. 11.43)*** while acylated pyridoxine exerts proton sponge effect when tethered on nanoparticles that helps in escaping lysosomal degradation to facilitate intracellular drug release resulting fifteen-fold reduction in the therapeutic dose of doxorubicin with enhanced antitumor efficacy **(*ACS Appl. Mater. Interfaces* 2016; I.F. 10.38)**. He elucidated key mechanism of Aggregation Induced Emission demonstrating image-guided chemotherapy showing enhanced antitumor efficacy using anisamide anchored lyotropic nano-liquid crystals **(*ACS Appl. Mater. Interfaces* 2018; I.F. 10.38**) while the tumor microenvironment was modulated using endogenous stimuli sensitive nano-systems through synergistic amplification of Mn^{+2} with betulinic acid to achieve comprehensive cancer nano-theranostics without external stimulus (***Acta Biomaterialia 2020; I.F. 10.63*)**. He also demonstrated that lipid bilayer–camouflaged mesoporous silica nanoparticles deliver metformin and topotecan in a synchronized manner that promotes apoptosis via mitochondrial membrane depolarization to achieve 100-fold higher drug concentration in tumors **(*Adv. Healthcare Mater 2018 I.F. 11.12*)** while redox-sensitive micellar system bearing aldose reductase inhibitor epalrestat and doxorubicin gets disrupted in tumor redox environment to promote synergistic tumor suppression **(*Biomater.Sci.* 2019; IF 7.59)**. He elucidated that pegylated chondroitin and hyaluronate anchored taxanes expedite CD44 receptor-mediated endocytosis to exhibit higher tumor regression through the mitochondrial-lysosomotropic pathway (***ACS Appl. Mater. Interfaces* 2018; I.F. 10.38)** while enhancing oral bioavailability through reversible P-gp modulation a with a significant reduction in tumor growth ensuing patient-friendly "chemotherapy at home" (***Acta Biomaterialia 2015; I.F. 10.63*)**. Over the years he has published more than **145 research papers** (with **h-index** of **43** and **citation** of more than **6500**) in peer reviewed international journals.

Translational contribution and commercialization: He successfully developed layer-by-layer (LBL) and SMEDDS technology that impacted product development in the area of bone-related disorders. He has been instrumental in patenting 27 technologies, out of which **FIVE have been licensed** to Industries while **TWO are commercialized** as **Joint Fresh**™ and **Reunion**™ **[**(*Granted **US patent** 8,496,964; **AU Patent**; 2010217238A; **EP patent** 2400957 B1*) Other products for the treatment of osteoarthritis and bone loss are also developed (Granted ***US Patent** 10,596,115; **AU Patent** 2014291615; **US patent** 10265297*)]. 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.

SUN Pharma Science Foundation
15-Barakhamba Road, Connaught Place,
New Delhi – 110001

(Prof. Shubhini A. Saraf)