

Department Name:

Anti-Cancer Drug Development & Chemotherapy

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While the combination of systemic multi-agent chemotherapy (5-Fluorouracil (5FU) + cisplatin) and tumor irradiation has achieved some success as a cancer therapeutic regimen, I believe we can achieve even greater efficacy through the use of multi-modality nanoparticles /nano-conjugates for targeted cancer treatment. Well-known for its applications in the information and communication industries, nanotechnology is now emerging as an ideal tool for biomedical applications. Applications of single modality therapeutics are challenged due to collateral toxicities. In contrast, polymeric nanoparticles could provide a platform to synergize different modalities like photo-thermal therapy as well as chemotherapy in a single package along with advanced imaging facility for efficacious cancer treatment.

In recent years our research interest is also expanding towards the development of improved version of small molecular organometallic chemotherapeutics. Platinum based chemotherapeutics are considered as the first line of treatment for many deadly cancer types including lung, head & neck. Pre-operative as well as post-operative control of the disease progression primarily depends on the success of platinum based chemotherapeutics, especially in some lethal cancer types. However, significant systemic toxicity, including severe nephrotoxicity as well as neurotoxicity, limited the usage of the mother molecule, Cisplatin. Moreover developing drug resistance is adding up to the challenges of Cisplatin application. Next versions, Carboplatin and Oxaliplatin reduced the toxicity achieving some success in certain types of malignancies. In continuation, we believe further improved version of metal based small molecular chemotherapeutics could be developed having greater efficacy and reduced toxicity, for the treatment of aggressive malignancies.

Ongoing research work:

- **Development of a multi-modality nano-conjugate for magnetic field guided selective cancer therapy**
- **Development of a novel class of organometallic complex for advanced cancer therapy**

Recent Publication:

1. **Supratim Ghosh**^{1*}, Sumana Mallick², Upasana Das¹, Ajay Verma³, Uttam Pal², Sabyasachi Chatterjee², Abhishek Nandi², Krishna D. Saha², G. Suresh Kumar² and William H. Gmeiner⁴ “Curcumin stably interacts with DNA hairpin through minor groove binding and demonstrates enhanced cytotoxicity in combination with FdU nucleotides” *BBA-General Subjects* 1862 (2018) 485 -494. [Impact Factor - 5.08]
2. Upasana Das¹, Aditi Sahoo², Subhas Haldar³, Sudin Bhattacharya¹, Shyam Sundar Mandal¹, William H. Gmeiner³, **Supratim Ghosh**^{1*} “Secondary Structure Dependent Physicochemical Interaction of Oligonucleotides with Gold Nanorod and Photothermal Effect for Future Applications: A New Insight” *ACS omega* 3 (10), 14349-14360