

Designer nanomedicines and nanosensors: Important roles in human health

Santimukul Santra, Ph.D.

The design and syntheses of biocompatible multifunctional nanomedicines and nanosensors are emerging fields of research with important applications in drug delivery, cancer treatment, infectious disease detection and sensing. Our lab is focused on developing new biodegradable polymeric nanomedicines for the targeted delivery of theranostic agents to the specific tumor. New methods for three-dimensional hyperbranched polyester (HBPE) polymer synthesis and polymeric nanomedicine formulation are developed for the targeted cancer imaging and treatment. This presentation will include the importance of nanotechnology in the evaluation of therapeutic efficacy of new line of anti-cancer drugs. Inhibitor-induced cancer nano-chemotherapeutics are developed and showed more than 80% of lung cancer cell death within 24 h of incubation. Results indicated that nanotechnology-based combination therapy approach is one of the most effective ways to overcome the multidrug drug resistant (MDR) effect. In addition to nanomedicine, the second part of this talk will highlight on our newly formulated magnetic nanosensors (MRnS) for the early detection of infectious diseases. The important role of magnetic relaxation technique will be discussed in nanosensor technology. The successful fabrication of antibody and small molecule-conjugated MRnS and their vital role in timely detection of E coli O157:H7, influenza (H1N1 and H5N1) and Zika (ZenV) viruses will be discussed in this presentation.