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Biosynthesis and conjugation techniques towards the development of theranostic nano-photosensitizers

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Nanotherapeutics have taken major role in the treatment of several life-threatening diseases including cancer, cardiovascular disease and microbial infections. Currently available photosensitizers used in Photodynamic Therapy (PDT) are hydrophobic in nature and therefore they are difficult to use in biological systems. Photosensitizers upon combination with nanomaterials can form nanosensitizers, which can be highly effective towards treating numerous deadly diseases. Biosynthetic strategies were therefore developed to construct theranostic nano-photosensitizers, which can simultaneously image and treat various tumors. A new class of near-IR absorbing photosensitizers with potential to act as a theranostic tool in the presence of a nanoscaffold was used for this purpose. Our synthetic strategies involve: (1) biosynthesis of noble metal nanoparticles, (2) development of charged and conjugatable near-IR photosensitizers and (3) bioconjugation of photosensitizers to nanomaterials. Further studies include: (1) anti-microbial assay, (2) anti-cancer assay and (3) use of *in vivo* (mouse) model utilizing PDT. These all-in-one multifunctional nano-photo probes are highly valuable as they eliminate the requirements to incorporate therapeutics and diagnostics agents separately on the nanoparticles and therefore beneficial for the treatment of various diseases.

Biography

Jayeeta Bhaumik obtained Ph.D. North Carolina State University, Raleigh. She received postdoctoral training for over four years from Harvard Medical School, Boston while working under the supervision of Prof Ralph Weissleder and Prof. Rakesh K. Jain. Currently, she is a Scientist sponsored by DST (Department of Science and Technology, Govt. of India) at National Institute of Pharmaceutical Education and Research, S.A.S Nagar, India. She has published in more than ten peer-reviewed journals and is an associate member of American Association of Cancer Research (AACR). Her current research involves development of nanotheranostics for photodynamic therapy of cancer and microbial infection.

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