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Combining nanotheranostics and photomedicine: Design and synthesis of nanophotomedicine

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Porphyrinic photosensitizers play essential role in photodynamic therapy (PDT), which is commonly used to treat diseases including cancer, cardiovascular disease and microbial infection. Tetrapyrrolic macrocycles are important members of porphyrin family, which largely contributes to PDT-mediated disease treatment. Though important as photomedicine, their hydrophobic nature prevents them to act efficiently in biological systems. Biocompatible nanomaterials are gaining high popularity in diverse biological applications. Nanoparticles are nowadays largely being applied as multifunctional probes, which can simultaneously be used for imaging and drug delivery. Combining photosensitizers with nanoparticles can large compensate limitations of their hydrophobicity. Various compact, hydrophilic and bio-conjugatable porphyrins were synthesized through rational routes. Taking advantage of the biocompatibility of NPs along with their large surface area for drug incorporation, porphyrins were successfully conjugated on NP surface via EDC mediated coupling. All those novel photosensitizers nanoconjugates were fully characterized by various techniques (e.g. spectrophotometric methods, HPLC). These newly developed nano photosensitizer scaffolds are highly valuable for possible photomedical and biomedical applications of PDT due to their biocompatibility.

Biography

Jayeeta Bhaumik obtained PhD in Organic Chemistry from North Carolina State University, Raleigh, USA in 2007. She carried out NIH postdoctoral fellowship at the Center for Systems Biology and later at the Dept. of Radiation Oncology, Massachusetts General Hospital and Harvard Medical School (2007-2011). Since 2012 she is a Scientist (sponsored by Dept. of Science & Technology, Govt. of India) at the Dept. of Pharmaceutical Technology (Biotechnology), NIPER, Mohali, India and pursuing research in the fields of nanobiotechnology and photomedicine.

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