

29th Euro-Global Summit on

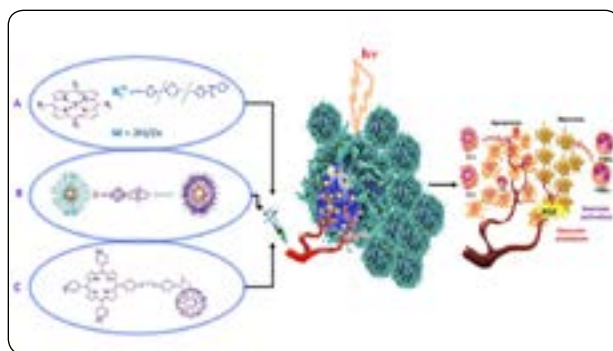
Cancer Therapy & Radiation Oncology

July 23-25, 2018 | Rome, Italy

Role of free-base and metallated porphyrin derivatives promoting apoptosis as a consequence of cancer photodynamic therapy: Synthesis, characterization, and photobiological activities

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Structural modifications of free-base and metallated hydrophilic porphyrin macrocycles: (a) with combinations of different cationic/anionic/neutral aromatic functions at the meso-positions, (b) capable of forming nanocomposites with Fe₃O₄ nanoparticles, and (c) functionalized with fullerenes through linkers via electrovalent or covalent interactions are designed, synthesized, isolated and characterized. Redshifts of absorption wavelengths beyond 640 nm along with the production of high quantum yields of singlet oxygen were achieved through the mentioned modes of derivatization of porphyrins under photodynamic conditions. Upon treatment of various cancer cell lines with these photosensitizers (PSs), some of them demonstrated significant ability to upregulate cellular reactive oxygen species (singlet oxygen) along with the promotion of apoptosis. The structure-activity relationship (SAR) that evolved between the photochemistry, photophysics and photobiological activities of these derivatives is indicative of their roles as well-suited candidates for non-invasive targeted oncological photodynamic therapy (PDT). Efficient accumulation of some of these PSs into the oxygen-rich cell organelles like mitochondria, further establish their potentials as possible alternatives to the commercially used PSs to treat malignant tumors in cancer PDT.



Recent Publications

1. Sengupta D, Mazumdar Z H, Mukherjee A, Sharma D, Halder A K, et al. (2018) Benzamide porphyrins with directly conjugated and distal pyridyl or pyridinium groups substituted to the porphyrin macrocycles: Study of the photosensitising abilities as inducers of apoptosis in cancer cells under photodynamic conditions. *Journal of Photochemistry and Photobiology B* 178:228–236.
2. Mazumder Z H, Chattopadhyaya S, Sharma D, Banerjee S and Sengupta D (2017) Synthesis of unsymmetrical water-soluble cationic pyridinium mesoporphyrinic free-base porphyrins and its Zn (II) complex: photophysical and photocytotoxicity evaluation. *IOSR Journal of Applied Chemistry (IOSR-JAC)* 10(7):43–50.

Biography

Devashish Sengupta has completed his PhD from The University of Sydney, Australia, under the supervision of Professor Peter A Lay. He is currently working as an Assistant Professor at the Department of Chemistry, Assam University, Silchar, Assam, India. His research interests include the photobiochemistry related to cancer photodynamic therapy, and antiviral activities of synthetic amphiphilic photosensitizers like fullerenes, porphyrins, porphyrin analogues, and other bioactive synthetic derivatives.

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