

New Photosensitizers Encapsulated within Arene-Ruthenium Complexes Active in Photodynamic Therapy: Intracellular Signaling and Evaluation in Colorectal Cancer Models

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Abstract : Colorectal cancer (CRC) is the third most common cancer and exhibits a consistently rising incidence worldwide. Despite notable advancements in CRC treatment, frequent occurrences of side effects and the development of therapy resistance persistently challenge current approaches. Eventually, innovations in focal therapies remain imperative to enhance the patient's overall quality of life. Photodynamic therapy (PDT) emerges as a promising treatment modality, clinically used for the treatment of various cancer types. It relies on the use of photosensitive molecules called photosensitizers (PS), which are photoactivated after accumulation in cancer cells, to induce the production of reactive oxygen species (ROS) that cause cancer cell death. Among commonly used metal-based drugs in cancer therapy, ruthenium (Ru) possesses favorable attributes that demonstrate its selectivity towards cancer cells and render it suitable for anti-cancer drug design. In vitro studies using distinct arene-Ru complexes, encapsulating porphyrin PS, are conducted on human HCT116 and HT-29 colorectal cancer cell lines. These studies encompass the evaluation of the antiproliferative effect, ROS production, apoptosis, cell cycle progression, molecular localization, and protein expression. Preliminary results indicated that these complexes exert significant photocytotoxicity on the studied colorectal cancer cell lines, representing them as promising and potential candidates for anti-cancer agents.

Keywords : colorectal cancer, photodynamic therapy, photosensitizers, arene-ruthenium complexes, apoptosis

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