Porphyrin conjugates with terpyridine moieties: complexation with metals and photodynamic activity

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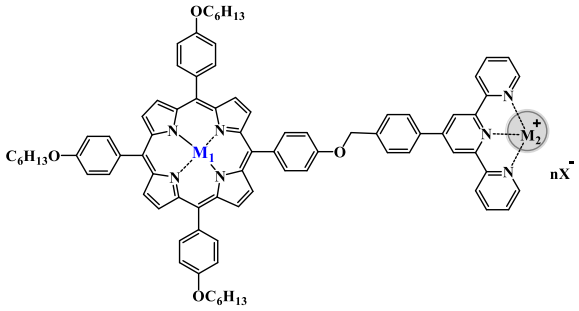
Today, the development of diagnostic methods in oncology is one of the most promising approaches to combat these diseases. The development of multifunctional theranostic systems for combined diagnosis and therapy of cancer using photodynamic therapy (PDT) and MRI is a promising approach in clinical practice. Currently, non-specific contrast agents based on paramagnetic metals (Gd(III), Mn(II), Fe(III)) are used in clinical diagnostics. Porphyrin structures, despite their well-known coordination abilities, cannot provide sufficiently dense and stable binding to metal ions of large radius. In this regard, the introduction of an external chelating fragment into the molecular structure is necessary to realize the theranostic concept. The creation of tetrapyrrole conjugates with 4′-(4-methylphenyl)-2,2′:6′,2″-terpyridine derivatives capable of coordinating metals regardless of their ionic radius is an important and relevant research in the diagnosis and treatment of malignancies. Conjugates of this type are promising research targets as potential theranostic agents.

This work is devoted to the development of strategies for the synthesis of multifunctional therapeutic agents based on *meso*-arylporphyrins with chelating ligands for potential therapeutic and diagnostic applications. Strategies for the synthesis of A3B- and A2B2-type conjugates were developed. For the obtained conjugates, their ability to complex with the metals Gd(III), Fe(III), Mn(II) was studied, the obtained metal complexes were characterized by a number of physical and chemical methods of analysis.



M_1 =Zn, M_2 = Gd^{III}; n =3; X=NO_3
M_1 =Zn, M_2 = Gd^{III}; n =3; X=Cl

An *in vitro* study of cell viability (MTT-test) revealed that a number of compounds have no toxic effect under dark conditions in the studied concentration range, while an appreciable light-induced toxicity is revealed upon irradiation. The new compounds appear to be safe and promising in terms of their further study as potential drugs for photodynamic therapy.

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