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ABSTRACT

Novel half-sandwich ruthenium(II) complexes with aminomethyl(diphenyl)phosphine derived from fluoroloquinolones (**RuPCp**, **RuPSf**, **RuPLm**, **RuPNr**) were being investigated as alternatives to well-established metal-based chemotherapeutics. All compounds were characterized by elemental analysis, selected spectroscopic methods (*i.e.*, absorption and fluorescence spectroscopy, ESI-MS, NMR, circular dichroizm), X-ray diffractometry, ICP-MS, and electrochemical techniques. To overcome low solubility, serious side effects connected with systemic cytotoxicity of ruthenium complexes, and acquiring the resistance of cancer cells, polymeric nanoformulations based on Pluronic P-123 micelles loaded with selected Ru(II) complexes were prepared and characterized. Resulting micelles (**RuPCp_M**, **RuPNr_M**) enabled efficient drug accumulation inside human lung adenocarcinoma (A549 tumor cell line), proved by confocal microscopy and ICP-MS analysis, allowing cytotoxic action. Studied complexes exhibited promising cytotoxicity *in vitro* with IC50 values significantly lower than the reference drug cisplatin. The fluorescence spectroscopic data (CT-DNA titration, cell staining *in vitro*) together with analysis of DNA fragmentation