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Evaluating anticancer activity and DNA-binding properties of cycloplatinated (II) water-soluble complexes

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According to WHO, cancer is the second leading cause of diseases globally and is responsible for an evaluated 9.6 million deaths in 2018 [1]. Universally, about 1 in 6 deaths is because of cancer [2]. New anticancer chemotherapeutics, that can effectively cure this disease with minimal side effects, maintain initial importance to the world research community [3]. In this study, four Pt-based complexes, [Pt (N^C) (CN) (L)], and [Pt (N^C) $(CN)_2$], in which N^C = deprotonated 2-phenyl pyridine (ppy) or benzo[h]quinoline (bhq), and L = *p*-Tolyl or methyl were synthesized [4,5]. These complexes are characterized by NMR spectroscopy. In addition, the biomolecular interactions of complexes with calf-thymus DNA (CT-DNA) and ethidium bromide (EB) are studied by fluorescence spectroscopy and UV−vis measurements. The potential of Pt complexes (C_1–C_4) to use as an anticancer agent and their cytotoxicity against MCF-7, A549, HT29, and MDA-MB-231 cancer cell lines were measured by using 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyl tetrazolium bromide (MTT) assay. To better understand the nature of the binding, a competitive assay between the complexes and ethidium bromide for DNA binding was studied. According to the results obtained from these analyses, [Pt(ppy)(CN)(*p*-Tolyl)] has more cytotoxicity for MCF-7, A549, and HT29 cancer cell lines, also, [Pt(bzq)(CN)(*p*-Tolyl)] has more cytotoxicity for MDA-MB-231 cancer cell lines. Overall, the present work suggests that a controlled modification could result in new potential antitumor complexes which can survive the repair mechanism and induce facile apoptosis. It can be concluded that the cyclomatalated platinum(II) complexes are highly promising leads for the development of novel effective DNA-targeted anticancer drugs.

***Keywords**:* cyloplatinated (II) complexes, water-soluble, anticancer activity, fluorescence spectroscopy, [Pt(N^C)(CN)(L)] complexes

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