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Study of DNA interaction of copper (II) Schiff base complexes and cellular mechanisms in cancer cell lines

Rafael Nunes Gomes [1] and Giselle Cerchiaro[1]

[1] Metal Biochemistry and Oxidative Stress Laboratory, Center for Natural Sciences and Humanities, Federal University of ABC – UFABC Santo André, SP Brazil.

E-mail:g.nunes@aluno.ufabc.edu.br

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A wide range of anticancer drugs can target various biological and cellular traits in multiple tumors. Anticancer drug development has recently shifted from traditional cytotoxicity to selective agents that work on particular cellular targets toward specific pathways, notably those involved in cell signaling[1]. Metals and metal compounds have been used for medicinal applications since ancient times. Many transition metal and main group element compounds have been tested for their effectiveness as anti-tumor agents[2]. Copper complexes are an alternative therapy or co-therapy against neoplasms. Given its very versatile redox capacity, copper can assume the most different geometric forms of coordination, and consequently, its high reactivity can be controlled in this way.

As a consequence, being an endogenous element, whose cells have full regulatory and transport capacity, copper complexes can be used as a potential drug against cancer cells[3]. In this work, biological assays were performed on neuroblastoma (SH-SY5Y) and gliblastoma (LN-18) cell lines. Initially, the capacity for interaction, cleavage, and oxidation of DNA by the synthesized copper complexes[4] was evaluated, using the comet assay[5] and UV-vis spectroscopy. The expression of proteins linked to cell death was evaluated using the Human Apoptosis Signaling Array C1 kit (RayBio1; Norcross, GA, USA). In vitro assays highlighted the cytotoxic potential of the complexes for the tumor lineage tested. Copper complexes can interact with DNA, causing oxidative damage due to the increase in intracellular copper concentration, causing the expression of proteins linked to apoptotic processes, related to the intrinsic pathway. Promoting programmed cell death via activation of proteins related to DNA damage, such as ATM, Chk1, and Chk2. And also via transforming growth factor β (TAK1).

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