

Searching for correlations between the geometry and cytotoxicity of imine-copper(II)-complexes

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Copper is an essential metal present in innumerable proteins and enzymes, being responsible for crucial activities in living organisms¹. On the other hand, many copper complexes have been reported in the literature as potential antitumor agents, based on its capability of binding to DNA and generating reactive oxygen species (ROS) that can cause oxidative damage to biomolecules. In this work, we are interested in determining the importance of metal center geometry in imine complexes, on its binding ability to DNA and on its antiproliferative properties against tumor cells².

We synthesized five new copper(II) complexes with Schiff-base ligands, containing N, O and/or S as donor atoms, and characterized them by spectroscopy techniques (UV/Vis, IR, EPR), and elemental analysis. Afterwards, we determined its cytotoxicity against tumor cells (HeLa) through MTT assays, after 24h incubation at 37°C.

Compounds	IC ₅₀ (μM)
[Cu(ica ⁺ dab)Cl]Cl·H ₂ O	7,5
[Cu(ica ⁺ tp)Cl]Cl·H ₂ O	22,2
[Cu(aft ⁺ dab)Cl]Cl·H ₂ O	35,1
[Cu(isa ⁺ tp)Cl]Cl	63,9
[Cu(isa ⁺ dab)Cl]Cl·H ₂ O	65,7

Table 1: Results IC₅₀. In these experiments, 1x10⁴ cells of HeLa, were placed in a 96 wells plate, using MEM culture medium supplemented with 10% FBS. After 24 hours of plating, medium was replaced by solutions containing compounds at concentrations in the range of 100 μM to 5 μM, and the incubation was maintained for 24 h. After this period, the medium culture was replaced again by a medium containing MTT, remained for 3 h. Subsequently, absorbance of each solution was verified at 570 nm.

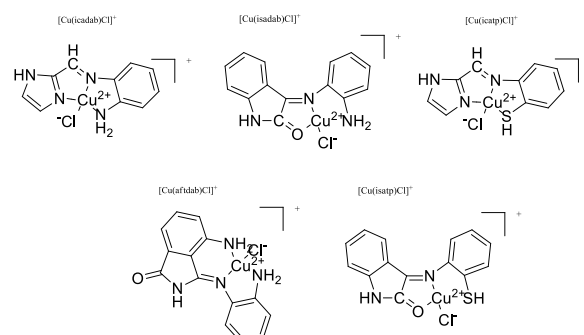


Figure 1: Structures of some Schiff base-copper(II) compounds studied.

The obtained results indicated that depending on the groups present in its structure, the geometry of such complexes can be different. Compounds containing an indole moiety (isa) presented a more tetrahedral geometry, while non-indolic compounds (ica) showed a more tetragonal structure. The MTT assays indicated a higher toxicity of the (ica) complexes in comparison to the (isa) compounds, these results indicated also a correlation between compounds geometry and its cytotoxicity.

References:

1. Kaim, W.; Rall, J., *Angew. Chem. Int. Ed. Engl.* 35 (1996) 43-60.
2. Anjomshoa, M.; Torkzadeh-Mahani, M.; *Spectrochim. Acta. Mol and Biomol Spectra* 150 (2015) 390-402.