

Structural and spectroscopic properties of iron(III) and zinc(II) bioinspired metal complexes with potential biological applications

F. R. Xavier^{1,*}

¹Departamento de Química, Universidade do Estado de Santa Catarina – UDESC, Joinville (SC), Brazil. *fernando.xavier@udesc.br

Metal complexes containing bioinspired ligands are growing in a variety of medicinal applications such as biocide and antitumoral agents.¹ Among them, iron(III) and zinc(II) compounds have been developed as potential candidates as antineoplastic and antimicrobe agents.² Parallel to this, a good example of bioinspired ligand that can interact with DNA is the bis(2-picolyl)amine (bpma) which consists in a quite versatile tridentate ligand that can be easily functionalized with pendant groups during its synthesis.³ Based on that, a series of $[MLCl_x]$ and $[ML_2](ClO_4)_x$ complexes (where M = Fe or Zn and L = L^{C5} or L^{C10OH}) was prepared (Fig 1, left).

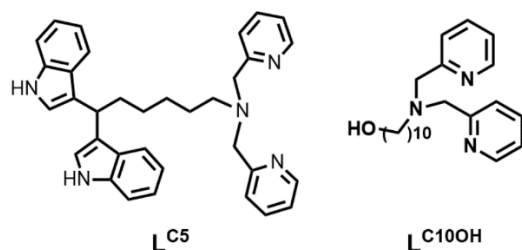


Fig 1. Bioinspired ligands herein studied.

All compounds were fully characterized by a suite of structural and physicochemical methods. The interaction between these compounds and DNA was monitored where binding constants (K_b) were obtained ($\sim 10^3$ to 10^4 $L \text{ mol}^{-1}$). These data were corroborated by *in silico* analysis. All complexes confirmed their biocide activity against selected microorganisms: *S. aureus*, *E. coli*, *A. fumigatus* and *S. cerevisiae*. Particularly towards *A. fumigatus*, $[FeL^{C10OH}Cl_3]$ and $[Fe(L^{C10OH})_2](ClO_4)_3$ have shown better biocide activity (IC_{50}) than the positive control fluconazole (1.3 and 4.9-fold, respectively). The cytotoxic activity was also tested against the erythroleukemia K562 cell line, where zinc-containing complexes and L^{C5} presented a linear relationship between the K_b and IC_{50} values at 24 h. This is a good indicative that these compounds can enter cellular environment and bond to DNA molecule. Finally, for all biological studies, it was probed that the presence of bis(indolyl)methane (L^{C5}) or *n*-alkyl chain (L^{C10OH}) moieties, as well as the metal ions could increase the magnitude of the biological activity upon the selected targets.

References

1. D. M. Yufanyi, T. Neville, et al. *Coord. Chem. Rev.* **414**, 213285 (2020).
2. (a) M. Melotti, et al. *New J. Chem.* **45**, 12902-12914 (2021). (b) P. S. Tessaro, et al. *J. Inorg. Biochem.* **236**, 111973 (2022).
3. C. Wende, et al. *Eur. J. Inorg. Chem.* **16**, 2597-2612 (2014).