Poster Presentation

MS012.P12

Zn(II) complexes of (1,3-thiazol-2-yl)hydrazones as potential pharmacological agents

Aleksandar Vinjevac[1], Jovana Araškov[2], Nenad R. Filipović[3], Tamara Todorović[2]
[1]*Croatian Association Of Crystallographers, Zagreb, Croatia,* [2]*Faculty of Chemistry, University of Belgrade, Belgrade, Serbia,*
[3]*Department of Chemistry and Biochemistry, Faculty of Agriculture, University of Belgrade, Belgrade, Serbia*
E-mail: aleksandar.visnjevac@irb.hr

Antimicrobial resistance due to the overuse of antibiotics and transmission of resistance within and between individuals is nowadays a serious public health threat. Therefore, there is an urgent need for development of new classes of antimicrobials that may not be as susceptible to bacterial resistance mechanisms as the current drugs [1]. Significant number of studies indicates promising antimicrobial activity of (1,3-thiazol-2-yl)hydrazones [2]. Upon metal coordination, many drugs revealed improved activity and fewer side effects. Metal complexes may act as vehicles for the activation of the ligands by increasing their ability to diffuse through the semipermeable membrane of cells. The major advantage of metal-complexes over corresponding organic ligands is the ability to vary coordination number and geometry. Zinc is an element of interest for biologically active complex preparation since it is essential trace element found in all animals, and to a much lesser extent toxic to humans than non-essential metals like e.g. platinum.

We recently reported structural and bioactivity studies on Co(III) complexes of 2-(2-(pyridine-2-ylmethylene)hydrazinyl)-4-(phenyl)-1,3-thiazole (HL1), 2-(2-(pyridine-2-ylmethylene)hydrazinyl)-4-(4-metoxyphenyl)-1,3-thiazole (HL2) and 2-(2-(pyridine-2-ylmethylene)hydrazinyl)-4-(4-tolyl)-1,3-thiazole (HL3) [3]. Our results have revealed intriguingly promising antibacterial and antioxidative activity of the novel complexes.

As a logical pursuit of this comprehensive study on the structure-(bio)activity relationship of the metal complexes of HL1–3, we hereby present the structural studies of a series of their zinc complexes, prepared by simple reactions of ZnCl2 and Zn(NO3)2 with each of the ligands HL1–3: [ZnCl2(HL1)] (1), [Zn(HL1)2](NO3)2 ×H2O (2), [Zn(HL2)2][ZnCl4] (3), [Zn(HL2)2](NO3)2 × MeOH × H2O (4), [Zn(HL3)2][ZnCl4] (5) and [Zn(HL3)2](NO3)2 × 3H2O (6). All complexes were characterized by elemental analysis, molar conductivity measurements, UV-Vis, IR and NMR spectroscopic analyses. Single crystals suitable for the X-ray analysis of 1–5 were successfully prepared and diffraction studies were conducted. Structure of 1 is characterized by 1:1 metal to ligand ratio, while all other complexes reveal 1:2 metal to ligand ratio. In all complexes, the tridentate NNN coordination is observed. In the molecular complex of 1 zinc is located in a centre of a slightly distorted trigonal bipyramid with triazole and pyrimidine N atoms occupying the apical positions. In cationic complexes of 2, 3, 4 and 5, more or less severely distorted octahedral coordination cores are formed around the Zn atom and the overall charge is balanced by the presence of two nitrate anions (2 and 4) or two ZnCl42- anions (3 and 5) per complex molecule. Crystal structure of 1 is characterized by the distinct H-bonded centrosymmetric dimers of a graph-set notation R(2,2)10. In the nitrato-complexes 2 and 4, the two hydrazine nitrogen atoms act as donors in bifurcated H-bonds, connecting both ligand molecules of the cationic complex to two oxygen atoms from the corresponding nitrate anionic moieties. These neutral assemblies appear as distinct building blocks of the crystal structures. Finally, H-bonding patterns in the isostructural structures 3 and 5 are analogous. A single observed H-bond connects the hydrazine nitrogen as a donor to a chlorine from the ZnCl4- anion as an acceptor, hence an "endless" chain is formed parallel

[1] Borges, A., Ferreira, C., Saavedra, M. J., Simões, M. (2013) Microb. Drug Resist., 19, 256–265.
[2] Elshaflu, H., Bjelogrlić, S., Muller, C. D., Todorović, T. R., Rodić, M., Marinković, A., Filipović, N. R. (2016) J. Coord. Chem. 69, 3354–3366.
[3] Filipović, N. R., Elshaflu, H., Grubišić, S., Jovanović, Lj. S., Rodić, M. V., Novaković, I., Malešević, A., Djordjević, I., Li, H., Šojić, N., Marinković, A., Todorović, T. R. (2017) Dalton Trans. DOI: 10.1039/C6DT04785H

Keywords: zn complexes, thiohydrazones, antimicrobial resistance