III6. Health Microbiology and Biotechnology

P273. Antimicrobial Activity of New Silver (Thio)Semicarbazone Derivatives

Tiago A. Fernandes[1,2], Aliaksandr S. Arol[1,3], Ângela França[4], Vânia André[1], Sergei Mikhalyonok[3], Nuno Cerca[4], Alexander M. Kirillova[5]

[1] Centro de Química Estrutural, Instituto Superior Técnico, Universidade de Lisboa, Lisboa, Portugal

[2] Departamento de Química e Bioquímica, Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal

[3] Department of Organic Chemistry, Belarusian State Technological University, Minsk, Belarus

[4] Centre of Biological Engineering, Laboratory of Research in Biofilms Rosário Oliveira (LIBRO), University of Minho, Campus de Gualtar, Braga, Portugal

[5] Research Institute of Chemistry, Peoples' Friendship University of Russia (RUDN University)

[6] Miklukho-Maklaya st., Moscow, Russian Federation

E-mail: *nunocerca@ceb.uminho.pt*

Background

Among the bioactive metals, silver exhibits the highest toxicity to bacteria, viruses, and other eukaryotic microorganisms. A large number of bioactive Ag(I) coordination compounds with different ligand environment have been reported and, in particular, the derivatives containing weak Ag−O and/or Ag−N bonds can exhibit a high bioactivity, lower light stability, and inferior solubility in water than the compounds with rather strong Ag−S or Ag−P bonds. Herein we describe the synthesis and antimicrobial activity of two new silver(I) compounds that feature the {AgNO} or {AgSO} environments and were derived from semicarbazone and thiosemicarbazone type ligands.

Methods

Organic ligands HL1 [1, 1-((4-nitrophenyl)(phenyl)methylene)-semicarbazone] and HL2 [2, 1-((4-nitrophenyl)(phenyl)methylene)-thiosemicarbazone] were prepared from 4-nitrobenzophenone via a one-step procedure from semicarbazide or thiosemicarbazide. Discrete silver(I) complexes [Ag(HL1) (NO3)] (3) and [{Ag(HL2)(NO3)}6] (4) were obtained in the reaction of AgNO3 with 1 or 2 in acetonitrile- acetone mixture. The Minimum inhibitory and minimum lethal concentration of the organic ligands were tested against Gram positive *S. epidermids* and *S. aureus* and Gram negative *P. aeruginosa* and *E. coli*. The ability to inhibit biofilm formation was also determined.

Results and conclusion

Two new silver(I) coordination compounds were prepared and fully characterized by standard methods (FTIR, NMR, ESI-MS, elemental analysis) as well as single-crystal X-ray diffraction. Of the 4 tested compounds, only 4 presented antimicrobial activity, including the ability to impair biofilm formation. However, the antimicrobial activity was only observed for the gram-positive bacteria. Further research on the design of other silver(I) coordination compounds and exploration of their antimicrobial potential is currently in progress in our laboratories.

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