Title: Redox-active cytotoxic diorganotin(IV) cycloalkylhydroxamate complexes with different ring sizes: Reduction behaviour and theoretical interpretation

Author(s): Shang, Xianmei[1,5]; **Alegria, Elisabete C. B. A.**[1,2]; Guedes da Silva, M. Fátima C.[1,3]; Kuznetsov, Maxim L.[1]; Li, Qingshan[4]; Pombeiro, Armando J. L.[1]

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Abstract: Two series of new diorganotin(IV) cycloalkylhydroxamate complexes with different ring sizes (cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl), formulated as the mononuclear [R2Sn(HL)(2)] (1:2) (a, R=Bu-n and Ph) and the polymeric [R2SnL](n) (1:1) (b, R=Bu-n) compounds, were prepared and fully characterized. Single crystal X-ray diffraction for [(Bu2Sn)-Bu-n{C5H9C(O)NHO}(2)] (3a) discloses the cis geometry and strong intermolecular NH center dot center dot center dot O interactions. The in vitro cytotoxic activities of the complexes were evaluated against HL-60, Bel-7402, BGC-823 and KB human tumour cell lines, the greater activity concerning [(Bu2Sn)-Bu-n(HL)(2)] [HL=C3H5C(O)NHO (1a), C6H11C(O)NHO (4a)] towards BGC-823. The complexes undergo, by cyclic voltammetry and controlled-potential electrolysis, one irreversible overall two-electron cathodic process at a reduction potential that does not appear to correlate with the antitumour activity. The electrochemical behaviour of [R2Sn(C5H9C(O)NHO)(2)] [R=Bu-n (3a), Ph (7a)] was also investigated using density functional theory (DFT) methods, showing that the ultimate complex structure and the mechanism of its formation are R dependent: for the aromatic (R = Ph) complex, the initial reduction step is centred on the phenyl ligands and at the metal, being followed by a second reduction with Sn-O and Sn-C ruptures, whereas for the alkyl (R=Bu-n) complex the first reduction step is centred on one of the hydroxamate ligands and is followed by a second reduction with Sn-O bond cleavages and preservation of the alkyl ligands. In both cases, the final complexes are highly coordinative unsaturated Sn-II species with the cis geometry, features that can be of biological significance. (C) 2012 Elsevier Inc. All rights reserved.

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KeyWords Plus: SN-119 NMR-Spectra; Antitumor-Activity; Organotin(IV)(N+) Complexes; Coordination-Compounds; Ruthenium Complexes; Crystal-Structures; Anticancer Drugs; Acid; Iminoacylation; Organonitriles

Reprint Address: Pombeiro, AJL (reprint author), Univ Tecn Lisboa, Inst Super Tecn, Ctr Quim Estrutural, Complexo 1, Av Rovisco Pais, P-1049001 Lisbon, Portugal.

Addresses:

1. Univ Tecn Lisboa, Inst Super Tecn, Ctr Quim Estrutural, P-1049001 Lisbon, Portugal
2. ISEL, Area Dept Engn Quim, P-1959007 Lisbon, Portugal
3. Univ Lusofona Humanidades & Tecnol, ULHT Lisbon, P-1749024 Lisbon, Portugal

4. Shanxi Med Univ, Sch Pharmaceut Sci, Taiyuan 030001, Peoples R China
5. Huazhong Univ Sci & Technol, Tongji Sch Pharm, Wuhan 430030, Peoples R China

E-mail Address: pombeiro@ist.utl.pt

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