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Metal-Based Anticancer Agents: In vitro DNA Binding, Cleavage and Cytotoxicity

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Abstract : Two new metal-based anticancer chemotherapeutic agents, [(Ph2Sn)2(HGuO)2(phen)Cl2] 1 and [(Ph3Sn)(HGuO)(phen)]- Cl.CH3OH.H2O 2, were designed, prepared and characterized by analytical and spectral (IR, ESI-Mass, 1H, 13C and 119Sn NMR) techniques. The proposed geometry of Sn(IV) in 1 and 2 is distorted octahedral and distorted trigonal-bipyramidal, respectively. Both 1 and 2 exhibit potential cytotoxicity in vitro against MCF-7, HepG-2 and DU-145 cell lines. The intrinsic binding constant (Kb) values of 1 (2.33 × 105 M-1) and 2 (2.46 × 105 M-1) evaluated from UV-Visible absorption studies suggest non-classical electrostatic mode of interaction via phosphate backbone of DNA double helix. The Stern-Volmer quenching constant (Ksv) of 1 (9.74 × 105 M-1) and 2 (2.9 × 106 M-1) determined by fluorescence studies suggests the groove binding and intercalation mode for 1 and 2, respectively. Effective cleavage of pBR322 DNA is induced by 1. Their interaction with DNA of cancer cells may account for potency.

Keywords : anticancer agents, DNA binding studies, NMR spectroscopy, organotin
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