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Inorganic pharmaceuticals: DNA-binding and anticancer activity of new compound

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Medicinal inorganic pharmaceutical chemistry is an interdisciplinary thrust area of chemical biology research; is currently much more known for its many applications in enzyme mimic catalysis and has enormous potential to act as therapeutic and diagnostic agents. Development of new drug design and therapeutic strategies that could target cancer cells leaving normal cells unaffected continues to be a challenge. Series of new pharmacophore of metallic compounds were designed, synthesized and characterized by various spectroscopic methods (IR, ESI–MS, 1H, 13C and Sn119 NMR) and further confirmed by X–ray crystallography. In vitro DNA binding studies of the compounds investigated by absorption and emission titration methods which revealed that recognizes the minor groove of DNA in accordance with molecular docking studies with the DNA duplex. Gel electrophoretic assay demonstrates the ability of 1 to cleave pBR322 DNA through hydrolytic/oxidative process which were further validated by T4 religation assay understand the drug–protein interaction of which ultimate molecular target was DNA, the affinity of compounds towards HSA was also investigated by the spectroscopic and molecular modeling techniques which showed hydrophobic interaction in the subdomain IIA of HSA. The SOD-like activity of the compounds was evaluated using a xanthine/xanthine oxidase assay, which showed SOD activity in the micro molar range for both the heterobimetallic complexes viz., (IC50) 0.082 μM. Furthermore, complexes showed high inhibitory activity against Topo-Iα at a concentration of 20 μM as IC50, suggesting that complex is an efficient DNA cleaving agent. In vitro studies on the anticancer activity against the HepG2 hepatocellular carcinoma cell line revealed that complexes have the capability to kill the chosen cancer cell, but the efficiency of few complexes are higher than the reported earlier. The mode of cell death induced by complex is primarily apoptosis as revealed by AO/EB staining, Hoechst 33258 staining, and assessment of the mitochondrial trans-membrane potential.

Biography

Sartaj Tabassum is working as a Professor in the Department of Chemistry, Aligarh Muslim University, Aligarh and presently he is working in King Saud University, Riyadh Saudi Arabia. He has published 105 papers in the journals of international repute. He is a Life Member of ICC, CRSI, ISCB, DNA Society of India and American Nano Society. He has successfully guided 16 PhD and has successfully completed many research schemes granted by TWAS, Italy, CSIR, New Delhi, DBT, Govt. of India. As a distinguished Scientist, he was awarded Overseas Associateship award in 2005 by DBT, Govt of India. He has signed several MoU and joint research collaboration with University of Camerino UNICAM, Italy, USM Malaysia and USTC Hefei, China. He has visited many countries for academic pursuit particularly: China, USA, Italy and Saudi Arabia as fellow, Visiting Professor and for the international conferences.

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