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Synthesis and Structures of Pincer-Type Rhodium(III) complexes; Reactivity Toward Small Biomolecules, calf thymus DNA (CT-DNA) and bovine serum albumin (BSA)

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A few novel rhodium(III) complex [RhIII(X)Cl3] (X = pyridin-bis(pirazole) ligands) were synthesized containing a pincer type, tridentate nitrogen–donor chelate system. All complexes were fully characterized, single crystal X-ray structure analysis has been done. The reactivity of the synthesized complex toward small biomolecules (L-methionine (L-Met), guanosine-5'-monophosphate (5'-GMP), L-histidine (L-His) and glutathione (GSH) and to a series of duplex DNAs and RNA was investigated. These measurements showed that the synthesized complex has a good affinity toward studied ligands and the obtained order of reactivity is: 5'-GMP > GSH >L-Met > L-His. Duplex RNA reacts faster than duplex DNA, while shorter duplex DNA (15mer GG) reacts faster compared with 22mer GG duplex DNA. In addition, a higher reactivity is achieved with a DNA duplex with centrally located GG-sequence than with 22GTG duplex, in which GG sequence is separated by a T base. Furthermore, the interaction of this metal complex to calf thymus DNA (CT-DNA) and bovine serum albumin (BSA) was further examined by absorption (UV-Vis) and emission spectral studies (EthBr displacement studies). Overall, the studied complex exhibited good DNA and BSA interaction ability. All obtained results in this study indicate that the introduction of pincer-type spectator ligand can be used to improve the reactivity of rhodium(III) complexes. Together, these observations show the reactivity characteristics needed for a potential anti-tumor agent, with the ability to target both DNA and proteins. Every new contribution in this field highly is warranted due to the current lack of clinically used metallo-based alternatives to cisplatin.

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