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Research Seminar

When: April 15, 2021
Time: 2:30 PM
Location: Microsoft TEAMS

Synthesis, Characterization, and Antiproliferation Activity of Alkylthiocarbamate Complexes

Abstract

Cancer is the second leading cause of death globally with an estimated 10 million deaths annually.[1, 2] Treatments available for cancer include chemotherapy, radiation therapy, hormone therapy, surgery, immunotherapy, and targeted therapy.[3] However, these treatments involve several disadvantages including high costs, lack of selectivity, drug resistance, uncertainty of long term effectiveness, and development of late lasting side effects.[3] Therefore, there is an urgent need for the development of new cancer therapeutics that can help overcome challenges faced by the already known treatments. Recently, various bis(thiosemicarbazone) (BTSC) copper complexes have been extensively studied for their imaging[4, 5] and therapeutic applications.[6, 7] The modular design of BTSCs allows easy variability in the structure by changing the backbone and pendent substituents. Currently, the two most widely studies Cu(BTSC) complexes are copper diacetyl-bis(methylthiosemicarbazone) (Cu(ATSM)) and copper glyoxal-bis(methylthiosemicarbazone) (Cu(GTSM)), which have been explored as a diagnostic imaging tool[4, 5] and a potential anticancer drug[8], respectively. Consequently, there is significant interest in developing complexes with similar features that might have improved activity and have a potential as an anticancer drug. In this talk, the synthesis, characterization and antiproliferation activities of two classes of alkylthiocarbamate ligands, which are related to BTSCs, and their respective metal complexes will be discussed. The first class consists of hybrid thiosemicarbazone-alkylthiocarbamate ligands and their metal complexes.[9] The hybrids can also be prepared in two constitutional isomer forms that alters their physical structure by changing the shape of the molecule. The second class consists of bis(ethylthiocarbamate) ligands and their metal complexes that display an interesting case of linkage isomerism. The antiproliferation activity of metal complexes has often been linked to the reduction potential values of the central metal. The complexes display varying activities associated with modulation of reduction potential values through changes in the backbone substituents. Other factors that can induce a change in the reduction potential including changes in pendent substituents and differences in the linkage of metal with the ligand will be discussed. The challenges faced in the synthesis of the constitutional isomers of hybrid complexes and the effect of their physical structure on the antiproliferation activities of these isomers will be discussed. The synthesis, characterization, and conversion of linkage isomers will be presented along with their antiproliferation activities.

References

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