Abstract

Anti-tumor activity of Organometallic Compounds

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Modern medicine has been focusing on proving new and alternative chemotherapeutic compounds with high tumor cytotoxicity and reduced side effects to combat drug resistance and improve drug efficacy in cancer treatment. Organometallic compounds have unique physio-chemical properties like structural diversity, ligand exchange, redox and catalytic properties which are now being used to develop potential candidates for cancer therapy. The impressive clinical effectiveness of cisplatin is limited by the significant side effects and emergence of drug resistance. One of the metals showing promise is ruthenium. Ruthenium compounds often have lower cytotoxicity compared to cisplatin and are better tolerated *in vivo*. Ru^{III} complexes maintain their metallic oxidation state till they reach tumor, where in hypoxic condition is reduced to Ru^{II}. Moreover, in many cancer types, iron uptake is upregulated. Ruthenium, being in the same group as iron is transported into the cells by the transferrin receptor which is overexpressed in many tumors. Therefore, the properties of tumors enhance both Ru uptake and toxicity relatively to normal tissues. DNA cleavage will lead to cell cycle arrest until the damage is repaired, or if it is too extensive to repair, it will undergo senescence and death that may be either dependent or independent of p53 tumor suppressor gene function. This project is focused on synthesis, purification and characterization of monometallic and bimetallic ruthenium compounds and evaluate its effects on glioblastoma, meningioma and pancreatic cell lines to analyze their effect on the proliferation of the tumor cells and their capacity to induce apoptosis.

This project was supported by NIH Grants 5P20RR016477 and P20GM103434 to the West Virginia IDeA Network for BioMedical Research Funding.