Synthesis, structural characterization, determining the mechanism of action of anticancer Ti(IV) complexes, and studying the impact of bio relevant molecules on their cytotoxicity

Titanium based complexes have been promising anti-cancer drugs since the early 1980s, but their hydrolytic instability at physiological conditions has made it difficult to achieve more advanced faces in clinical trials. Even though transferrin (Tf), the Fe(III) transport protein, accomplishes Ti(IV) stability and carries out the transportation function, the cytotoxicological activity of the Ti(IV) in cancer cells wasn't significant. Deferasirox, drug currently used as an iron chelator, is a ligand that could act as a Tf biomimetic, a molecule that imitates the binding site and that offers the same stabilizing and transporting function. I have synthesized, performed structural characterization of Ti(IV) complexes, and studied their cytotoxicity on normal and cancer lung cells. We have studied the stability of Ti(IV) complexes in the presence of bio relevant metals to understand the potential transportation of the complex through the bloodstream. Previous data obtained in the lab shows $Ti(citrate)_3$ to be cytotoxic at 700 mM. We are interested in studying how bio relevant molecules, such as Fe(III), could impact the cytotoxicity of $Ti(citrate)_3$. Focusing on the same line of thought, we want to determine the effects in stability and transportation of a Ti(IV) complex caused by albumin. Another approach we will be using in the elucidation of Ti-complexes' mechanism of action is to study both the cell cycle and apoptosis using flow cytometry in collaboration with Dr. Washington's lab.