Sharanya Bhaskaran

Major: Chemistry
University: University of Missouri- Columbia
Faculty Mentor: Dr. Kattesh Katti
Mentor Department: Radiology
Funded by: Molecular Imaging Program

Multifunctional phosphinimine ligand for 99m-Tc(VII) stabilization

Sharanya Bhaskaran, Ravi Pandrapragada, Raghuraman Kannan and Kattesh Katti

The preparation of higher oxidation state, in vivo stable, ^{99m}Tc(VII) (and Re(VII)) transition metal complexes bearing biologically active molecules has recently received considerable attention because of their potential applications in nuclear medicine and radiopharmacy. In particular, labeling strategies based on Tc(VII) conjugates would provide attractive prospects for labeling tumor specific peptides (and other tumor-avid biomolecules) directly with $^{99m}TcO_4^-$ without the intervention of external reducing agents (e.g. Sn(II)). Our approach for stabilizing Tc(VII) is based on the utility of phosphinimine ($R_3P=NSiMe_3$) ligand frameworks. In this context, we have designed a new multidentate phosphinimine ligand framework of the general formula $R'C(R_2P=NSiMe_3)_x$ (where x=2,3). Herein, we report the synthesis of a novel tridentate phosphinimine ligand, $(CH_3C(CH_2R_2P=NSiMe_3)_3)$, P3N3 (**1**), with "PN-PN-PN" ligand framework, and their coordination chemistry with $[MO_4]^-$ (M = ^{99m}Tc and Re).

Interaction of multifunctional phosphinimine ligand P3N3 (**1**) (10^{-4}M) with generator eluted pertechnatate (1-5mCi) at 25^0C produced ion-pair of composition $(CH_3C(CH_2R_2P=NH_2^+)_3(TcO_4^-)_3)$ (**2**) in >98% yields. The ion-pair $((P3N3)^+(TcO_4)_3^-)$ (**2**) formed is unequivocally characterized by paper chromatography and HPLC. The new Tc(VII) phosphinimine complex $((P3N3)^+(TcO_4)_3^-)$ (**2**) demonstrated very good stability over 24 hour time periods in ethanol, water, and HSA. This poster presentation will include details on the utility of "PN-PN-PN" framework for stabilizing Tc(VII) and in vitro stability profiles of the technetium complex. These results indicate that the Tc-phosphinimine ligands may be used in the design and development of a variety of new ^{99m}Technetium radiopharmaceuticals in the future.