

Title: Gallium Complexes for Molecular Imaging of Bone Tissue

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ABSTRACT

This thesis is focused on preparing new ligands for selective complexation of gallium, which might serve as potential radiopharmaceuticals for ^{68}Ga -PET bone imaging. Two new ligands were prepared, combining 1,4,7-triazacyclonone-1,4-diacetic acid macrocyclic skeleton and bis(phosphonate) pendant arm, bound to the remaining free nitrogen atom on the macrocycle. Macrocyclic skeleton is responsible for high kinetic and thermodynamic stability of the Ga^{3+} complex and the bis(phosphonate) pendant arm insures selective delivery of the complex to the bone tissue. Both new ligands were fully characterized by NMR and mass spectroscopy. Complexation of Ga^{3+} was studied by ^{31}P and ^{71}Ga NMR spectroscopy. Binding to bone tissue was simulated by adsorption of the complexes to hydroxoapatite. Radiochemical experiments including study of ^{68}Ga complexation kinetics and basic *in-vivo* experiments including biodistribution studies and PET examination were done in cooperation with Johannes-Gutenberg Universität Mainz in Germany. Data obtained from these experiments were compared with known analogic compounds with the same pendant arm bound on different macrocyclic skeleton.

Keywords: bis(phosphonate), bone tissue, ^{68}Ga , PET