

# ABSTRACT

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Title of Doctoral Thesis **Study of radiolabeling of PAMAM dendrimers of 1st and 4th generation with diagnostic and therapeutic radionuclides.**

Treatment and diagnosis of diseases using radioactive isotopes is important field on which pharmaceutical research is focused. In order to obtain drug which would specifically bind to receptors released by cells of affected organs and tissues and concurrently provide them a high dosage of radiation, one part of research projects is focused on finding carriers and also new metal chelators suitable for binding in a high number on biologically active molecule. This dissertation thesis is focused on a research of a new bifunctional chelator of trivalent metal ions bound in a high number on a branched dendrimer.

Different parameters evaluating suitability of chelator for bond creation with radioactive isotopes were reviewed. From the biggest part is this thesis focused on labeling of dendrimer macromolecules with ligands bound on their surface with three different radioactive isotopes. Success of the labeling under different conditions based on value of radiochemical purity of the sample was studied. Experiments revealed, that it is possible to label dendrimer conjugates with radioactive isotope with final value of radiochemical purity higher than 95%. Ligands on the surface of dendrimer bind  $^{111}\text{In}$  and  $^{177}\text{Lu}$  preferably. The most suitable conditions of labeling with three used radioisotopes were found. Radiochemical purity of samples was determined using available analytical methods. Dendrimers labeled with  $^{111}\text{In}$  seem to be more stable at room temperature than conjugates labeled with  $^{177}\text{Lu}$  and  $^{90}\text{Y}$ . Based on stability experiments with samples labeled with  $^{111}\text{In}$  performed in presence of competitive ligand it can be inferred that indium is firmly bound to the complex with ligand and conjugates prepared this way are suitable for the next experiments.

Biodistribution studies performed with samples labeled with  $^{111}\text{In}$  on rats revealed, that dendrimer conjugate with lower molecular weight is rapidly released from organism via renal system mostly in parent form in contrast with dendrimer conjugate with higher molecular weight which is considerably absorbed in kidney and liver.

Results obtained during the preparation of this dissertation thesis were published in professional international journal and presented on scientific conferences.