

Preparation, molecular modeling and biodistribution of ^{99m}Tc -phytochlorin complex

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Abstract Phytochlorin [21H, 23H-Porphine-7-propanoic acid, 3-carboxy-5-(carboxymethyl)13-ethenyl-18-ethyl-7,8-dihydro-2,8,12,17-tetramethyl-, (7S,8S)] was labeled with ^{99m}Tc and the factors affecting the labeling yield of ^{99m}Tc -phytochlorin complex were studied in details. At pH 10, ^{99m}Tc -phytochlorin complex was obtained with a high radiochemical yield of $98.4 \pm 0.6 \%$ by adding ^{99m}Tc to 100 mg phytochlorin in the presence of $75 \mu\text{g SnCl}_2 \cdot 2\text{H}_2\text{O}$ after 30 min reaction time. The molecular modeling study showed that the structure of ^{99m}Tc -phytochlorin complex presents nearly linear HO–Tc–OH unit with an angle of 179.27° and a coplanar Tc(N1N2N3N4) unit. Biodistribution of ^{99m}Tc -phytochlorin complex in tumor bearing mice showed high T/NT ratio ($\text{T/NT} = 3.65$ at 90 min post injection). This preclinical study showed that ^{99m}Tc -phytochlorin complex is a potential selective radiotracer for solid tumor imaging and afford it as a new radiopharmaceutical suitable to proceed through the clinical trials for tumor imaging.

Keywords Phytochlorin · ^{99m}Tc · SPECT · Tumor · Imaging

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