

سازمان انرژی اتمی ایران

مسوول محترم بورس و ماموریت های آموزشی

با ساتم

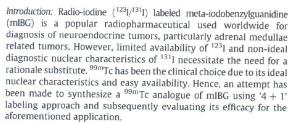
بدینوسیله گواهی می گردد سرکار خانم اقسانه لاهوتی در دومین کنگره تکنسیوم و سایر قلزات رادیو اکتیو در شیمی و پزشکی (Terachem 2014) در شهر برسانونه. کشور ایتالیا در تاریخ ۱۰ لغایت ۱۳ سپتامبر ۲۰۱۴ برگزار گردیده بود مقاله

Biodistribution of 80 nm iron oxide nanoparticles labeled with 99mTc in Balb/c mice

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پژوهشگاه علوم و فنون هسته ای



Methods: The work involved synthesis of '4' (NS₃ ligand) following a reported protocol [1] and an mIBG analogue bearing an isonitrile group ('1') at the meta position suitable for "59mTc labeling. A three step procedure starting from (3-(aminomethyl)phenyl)methanamine (A) was followed. Monoformylation of A was carried out followed by conversion of the free amine into guanidine group. Finally the formyl group was converted into an isonitrile moiety resulting in the formation of (3-(isocyanomethyl)benzyl)guanidine ('1').

The synthesized derivatives (4 and 1) were then radiolabeled with 99m Tc following the established '4 + 1' approach. The formation of the complex was ascertained by HPLC.

Results: The desired derivative '1' was synthesized in an overall yield of 60%. The radiolabeled product was obtained in 85% yield and purity as characterized by HPLC.

Conclusion: Further steps are underway to carry out *in vitro* study of the radiolabeled preparation, to ascertain its efficacy for imaging neuroendocrine tumors.

Reference

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[1] Seifert S, et al. Bioconjug Chem 2004;15:856-63.

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$\mathsf{Tc}^{\mathrm{II}}\text{-}\mathsf{based}$ mixed complexes for the design and the development of new SPECT tracers

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The trivalent state is the most stable oxidation state of technetium and rhenium, however, none of the radiopharmaceuticals currently in clinical use contains the metal in this oxidation state. We present here a general procedure for the preparation of a series of six-coordinated mixed ligand [$^{99/99m}Tc^{III}(PS)_2(L^n)$] compounds, (PS = phosphino-thiolate; L^n = dithiocarbamate) to design a new class of Tc^{III} -imaging agents.

[99mTc]II(PS)₂(Lⁿ)] complexes were prepared in aqueous conditions, in high yield, by the addition of pertechnetate to a vial containing SnCl₂ and the selected PS and Lⁿ ligands. ^{99m}Tc-complexes were analyzed by HPLC and compared with the corresponding fully characterized ⁹⁹Tc-complexes. All complexes are constituted by the [^{99,99m}Tc^{III}(PS)₂]⁺ moiety where two phosphino-thiolate ligands are tightly bound to the metal while the remaining two positions are saturated by a dithiocarbamate chelate, also carrying bioactive molecules. All complexes were inert toward ligand exchange reactions. No significant in-vitro and invivo biotransformation were observed underlining their remarkable thermodynamic stability and kinetic inertness.

These results can be utilized to design a novel class of ^{99m}Tc^{III}-based radiotracers useful for essential or target specific imaging agents.

Acknowledgments

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Biodistribution of 80 nm iron oxide nanoparticles labeled with $^{99m}{\rm Tc}$ in Balb/c mice

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Introduction: Recently ultrasmall superparamagnetic iron oxide (USPIO) nanoparticles (NPs) have been widely used for medical applications. One of their important applications is using these particles as MRI contrast agent. The aim of this study was to evaluate the biodistribution of dextran coated iron oxide NPs labeled with ^{99m}Tc with 80 nm hydrodynamic size via intravenous injection in Balb/c mice. Methods: The 80 nm NPs were dispersed in phosphate buffered saline (PBS) and SnCl₂ which was used as a reduction reagent. Subsequently, the radioisotope ^{99m}Tc was mixed directly into the reaction solution. The labeling efficiency of USPIOs labeled with ^{99m}Tc was above 99%. Sixty mice were sacrificed at 12 different time points (from 1 minute to 48 hours post injections). The percentage of injected dose per gram of each organ was measured by direct counting for 19 harvested organs of the mice [1]. Results: The biodistribution of ^{99m}Tc-USPIO in Balb/c mice showed

Results: The biodistribution of ^{99m}Tc-USPIO in Balb/c mice showed dramatic uptake in reticuloendothelial system. Accordingly, about 78 percent of injected dose was found in liver and spleen at 15 minutes post injection and more than 25% of the NPs remain in liver after 48 hours post-injection and their clearance is so fast in other organs [2]. Conclusion: The results suggest that USPIOs as characterized in our study can be potentially used as contrast agent in MR imaging, distributing in the reticuloendothelial system specially spleen and liver.

References

- [1] Shanehsazzadeh S, et al. J Radioanal Nucl Chem 2013;295:1517–23.
- [2] Shanehsazzadeh S, et al. Nucl Med Commun 2013;34:915–25.

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(2-Hydroxyphenyl)diphenylphosphine as fac-[Re/ $^{99m}Tc(CO)_3$] $^+$ -ligand

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Mixed ligand $\mathit{fac}\text{-}[\text{ML}^1\text{L}^2(\text{CO})_3]$ (M = Tc(I), Re(I)) complexes, containing a monoanionic bidentate L² and a monodentate ligand L¹, are particularly interesting for the development of new radiopharmaceuticals. Coupling of a vector to one ligand and tuning of pharmacokinetics with the other provide unique design versatility. In this work we have studied (2-hydroxyphenyl)diphenylphosphine (POH) as a ligand to the $\mathit{fac}\text{-}[\text{Re}/^{99m}\text{Tc}(\text{CO})_3]^+$ -fragment. In equimolar amounts, POH readily reacts with the $[\text{NEt}_4]_2[\text{ReBr}_3(\text{CO})_3]$ precursor to afford $\mathit{fac}\text{-}[\text{Re}(\text{PO})$