بسمه تعالی

سازمان انرژی اتمی ایران

پژوهشگاه علوم و فنون هسته ای
پژوهشکده کاربرد پرتوها

تاریخ : ....
شماره : ....
پیوست : ....

مسوول محترم بورس و ماموریت های آموزشی

با سلام

بدینوسیله گواهی می گردد سرکار خانم افسانه لاهوتی در دومین کنگره تکنسیوم و سایر فلزات 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

را به جای اینجانب به عنوان نفر اول ارائه کردند. مراتب جهت اقدام مقتضی حضورتان ارائه می گردد.

با تشکر

سعید شانه ساززاده

استادیار گروه رادیوداروها ۹۳/۱۲/۱۶

پژوهشگاه علوم و فنون هسته ای

دل هر ذره را که بشکافی آفتابیش در میان بینی

تهران، انتهای کارگر شمالی، سازمان انرژی اتمی ایران، پژوهشگاه علوم و فنون هسته ای، پژوهشکده کاربرد پرتوها – صندوق پستی: ۴۴۸۶-۱۱۳۶۵
تلفن: ۸۸۲۲۱۳۳۳(۰۲۱) نمابر: ۸۸۲۲۱۲۱۹(۰۲۱)

یزد، کیلومتر ۱۵ جاده یزد – تفت تلفن: ۶۲۳۴۸۴۰(۰۳۵۲) فکس: ۶۲۳۴۷۴۰(۰۳۵۲) صندوق پستی: ۸۹۱۷۵-۳۸۹

Introduction: Radio-iodine ($^{123}I/^{131}I$) labeled meta-iodobenzylguanidine (mIBG) is a popular radiopharmaceutical used worldwide for diagnosis of neuroendocrine tumors, particularly adrenal medullae related tumors. However, limited availability of ^{123}I and non-ideal diagnostic nuclear characteristics of ^{131}I necessitate the need for a rationale substitute. ^{99m}Tc has been the clinical choice due to its ideal nuclear characteristics and easy availability. Hence, an attempt has been made to synthesize a ^{99m}Tc analogue of mIBG using '4 + 1' labeling approach and subsequently evaluating its efficacy for the aforementioned application.
Methods: The work involved synthesis of '4' (NS_3 ligand) following a reported protocol [1] and an mIBG analogue bearing an isonitrile group ('1') at the meta position suitable for ^{99m}Tc 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

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

http://dx.doi.org/10.1016/j.nucmedbio.2014.05.055

45
Tc^{III}-based mixed complexes for the design and the development of new SPECT tracers

N. Salvarese[a], N. Morellato[b], A. Dolmella[b], L. Meléndez-Alafort[a], D. Carpanese[a], A. Rosato[a], F. Refosco[c], C. Bolzati[c]

[a]*DiSCOG-University of Padua, Italy*
[b]*DSF-University of Padua, Italy*
[c]*IENI-CNR, Padua, Italy*

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.

$[^{99m}Tc^{III}(PS)_2(L^n)]$ complexes were prepared in aqueous conditions, in high yield, by the addition of pertechnetate to a vial containing $SnCl_2$ and the selected PS and L^n ligands. ^{99m}Tc-complexes were analyzed by HPLC and compared with the corresponding fully characterized ^{99}Tc-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 in-vivo 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

This research was supported by MIUR (PRIN-20097FJHPZ-004 and FIRB-RBAP114AMK "RINAME") and by AIRC (IG-13121).

http://dx.doi.org/10.1016/j.nucmedbio.2014.05.030

46
Biodistribution of 80 nm iron oxide nanoparticles labeled with ^{99m}Tc in Balb/c mice

Saeed Shanehsazzadeh[a,b], Afsaneh Lahooti[b]

[a]*Radiopharmaceuticals Research Group, NSTRI, P.O. Box: 11365–3486, Tehran, Iran*
[b]*Department of Medical Physics and Biomedical Engineering, TUMS, Tehran, Iran*

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 $SnCl_2$ 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 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.

http://dx.doi.org/10.1016/j.nucmedbio.2014.05.094

47
(2-Hydroxyphenyl)diphenylphosphine as *fac*-$[Re/^{99m}Tc(CO)_3]^+$-ligand

A. Shegani[a], C. Triantis[a], F. Tisato[b], V. Peruzzo[b], B. Nock[a], T. Maina[a], C. Raptopoulou[a], V. Psycharis[a], I. Pirmettis[a], M. Papadopoulos[a]

[a]*NCSR "Demokritos"/GR*
[b]*IENI-CNR/IT*

Mixed ligand *fac*-$[ML^1L^2(CO)_3]$ (M = Tc(I), Re(I)) complexes, containing a monoanionic bidentate L^2 and a monodentate ligand L^1, 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 *fac*-$[Re/^{99m}Tc(CO)_3]^+$-fragment. In equimolar amounts, POH readily reacts with the $[NEt_4]_2[ReBr_3(CO)_3]$ precursor to afford *fac*-[Re(PO)