



AULA VIRTUAL de RADIOFARMACIA

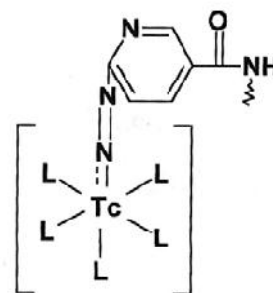
Plataforma Virtual de Formación Continuada en Radiofarmacia

www.aulavirtualradiofarmacia.es

Lecturas recomendadas

Las hidrazinas aromáticas se ha empleado como ligandos bifuncionales para la obtención de radiofármacos tecnecios y constituyen un ejemplo de los nuevos “cores” del Tc que se están desarrollando básicamente para el marcaje de biomoléculas, permitiendo a través del núcleo **HYNIC** (hidrazidonicotinamida) la realización de marcajes con alta eficiencia y elevada actividad específica.

Entre las propiedades del núcleo **HYNIC** se mencionan la formación de las múltiples formas isoméricas resultantes de las diferentes formas de unión de la tricina con el complejo **Tc-HYNIC**, así como las distintas formas isoméricas que pueden interconvertirse entre sí, dependiendo de las condiciones de reacción.



Core = Tc(HYNIC)

El estudio del core **HYNIC** constituye sin duda, una de las recientes líneas de investigación de la Radiofarmacia, en su búsqueda para obtener derivados peptídicos marcados con ^{99m}Tc , siendo un ejemplo los recientes artículos publicados en el mes de septiembre en *The Journal of Nuclear Medicine*, cuyos resúmenes presentamos a continuación, recomendando asimismo la lectura de los mismos.

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^{99m}Tc-Hydrazinonicotinamide Epidermal Growth Factor–Polyethylene Glycol–Quantum Dot Imaging Allows Quantification of Breast Cancer Epidermal Growth Factor Receptor Expression and Monitors Receptor Downregulation in Response to Cetuximab Therapy Kyung-Ho Jung, Yearn Seong Choe, Jin-Young Paik and Kyung-Han Lee. *J Nucl Med* 2011 52:1457-1464

Abstract

Therapy of cancer, including basallike breast tumors, that targets the epidermal growth factor receptor (EGFR) would greatly benefit from noninvasive methods that can quantitatively monitor receptor status and treatment response.

Methods: Here, we investigated the potential of a novel technique based on streptavidin cadmium selenide/zinc sulfide quantum dots (Qdots) multiplexed with polyethylene glycol (PEG), epidermal growth factor (EGF), and ^{99m}Tc-hydrazinonicotinamide. In vitro binding affinity and specificity were evaluated in cultured cells. Biodistribution studies and in vivo imaging were performed in murine breast tumor xenografts of basallike phenotype MDA-MB-468 cells and EGFR-negative cells.

Results: ^{99m}Tc-hydrazinonicotinamide EGF-PEG-Qdot showed specific and high-affinity EGFR targeting on confocal microscopy, immunoblotting, and binding assays. When intravenously injected, MDA-MB-468 tumors were visualized with high contrast by both optical and scintigraphic imaging. Scintigraphic image-based quantification correctly discriminated high-EGFR-expressing MDA-MB-468 tumors from other tumors, and image-based tumor uptake closely correlated to EGFR content. Importantly, serial imaging of MDA-MB-468 tumors responding to cetuximab therapy could detect a significant reduction of tumor uptake that was paralleled by downregulation of EGFR expression. Furthermore, high baseline uptake predicted good response to cetuximab therapy.

Conclusion: ^{99m}Tc-hydrazinonicotinamide EGF-PEG-Qdot provides EGFR-targeted imaging of breast tumors and may allow noninvasive monitoring of EGFR status in living subjects before and after targeted therapies.



Patient-Specific Radiation Dosimetry of ^{99m}Tc -HYNIC-Tyr³-Octreotide in Neuroendocrine Tumors, Joshua Grimes, Anna Celler, Bozena Birkenfeld, Sergey Shcherbinin, Maria H. Listewnik, Hanna Piwowarska-Bilska, Renata Mikołajczak, Piotr Zorga. *J Nucl Med* 2011 52:1474-1481

Abstract

^{99m}Tc -hydrazinonicotinamide-Tyr³-octreotide (^{99m}Tc -HYNIC-TOC) is increasingly gaining acceptance as a new radiopharmaceutical for the diagnosis of pathologic lesions overexpressing somatostatin receptors. However, little information has been published about the radiation dosimetry of this agent. The aim of this study was to assess the biodistribution and radiation dosimetry of commercially available ^{99m}Tc -HYNIC-TOC. A dose calculation procedure designed to be feasible to implement in a busy clinical environment was used.

Methods: Twenty-eight patients were imaged for suspected neuroendocrine tumors using a series of whole-body planar, dynamic planar, and SPECT/CT studies, after injection with ^{99m}Tc -HYNIC-TOC. Patient-specific dosimetry was performed using the OLINDA/EXM software with time-integrated activity coefficients estimated from a hybrid planar/SPECT technique. A phantom experiment was performed to establish adaptive thresholds for determination of source region volumes and activities.

Results: Pathologic uptake, diagnosed as due to neuroendocrine tumors, was observed in 12 patients. Normal organs with significant uptake included the kidneys, liver, and spleen. The mean effective dose after ^{99m}Tc -HYNIC-TOC injection was 4.6 ± 1.1 mSv. Average normal-organ doses were 0.030 ± 0.012 , 0.021 ± 0.007 , and 0.012 ± 0.005 mGy/MBq for the spleen, kidneys, and liver, respectively. The interpatient kidney dose ranged from 0.011 to 0.039 mGy/MBq, whereas the range of tumor doses varied from 0.003 to 0.053 mGy/MBq. The ratio of tumor to kidney dose ranged from 0.13 to 2.9. The optimal thresholds for recovery of true activity in the phantom study were significantly lower than those used for volume determination.

Conclusion: The patient-specific 3-dimensional dosimetry protocol used in this study is a clinically feasible technique that has been applied to demonstrate large dose variations in tumors and normal organs between patients imaged with ^{99m}Tc -HYNIC-TOC.