Lead-203 VMT-α-Neuroendocrine Tumor Scintigraphy: A Promising Theranostics Agent

Abstract

Targeted alpha therapy (TAT) using lead-212 (Pb-212)-labeled peptides presents an attractive option for the treatment of metastatic neuroendocrine tumors (NETs). As Pb-203 presents an accurate diagnostic surrogate to Pb-212, imaging with Pb-203-labelled peptides can be an important prerequisite to assess the feasibility of TAT with Pb-212-labelled agents. Here, we present the imaging data of a patient with metastatic NET with Pb-203 VMT-α-NET, a somatostatin receptor targeting agent, and demonstrate the matching distribution of Pb-203 VMT-α-NET with Ga-68 DOTANOC.

Keywords: *Lead-203, lead-212, neuroendocrine tumor scintigraphy, theranostic*

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The elementally identical diagnostic lead-203 (Pb-203) with therapeutic Pb-212 presents an encouraging theranostics pair.[1] Imaging/dosimetric data required for Pb-212-labeled radiopharmaceuticals can be acquired using Pb-203 ($t1/2$ = 51.9 h), which decays with 80.1% emission of γ-rays at 279 Kev and has a well-described radiochemistry.[2-6]

In this 65-year-old man, a case of well-differentiated metastatic neuroendocrine tumor (NET) of the pancreas, refractory to conventional therapy, Pb-203 VMT-α-NET imaging was performed to assess the feasibility of performing Pb-212 VMT-α-NET therapy. VMT-alpha-peptide (provided by Viewpoint, USA), a proprietary molecule targeting the somatostatin receptors on NET cells, was labeled with Pb-203 with labeling efficiency and radiochemical purity >95%. The sample was sterile and pyrogen-free. Whole-body planar (279 Kev ± 10% window, scan speed of 8 cm/min) and single-photon emission computed tomography-CT (SPECT-CT) images (279 ± 10% Kev, 60 views, 15 sec/view, CT-130 kV, and mA-30s) were acquired on Siemens Symbia Intevo 6 SPECT-CT, using a medium-energy collimator, 2 and 24 h after injection of 260 MBq (7 mCi) of Pb-203 VMT-α-NET peptide. There was excellent uptake of Pb-203 VMT-α-NET peptide at all tumor sites with rapid clearance of background activity. A comparison of the positron emission tomography-CT images with Ga-68 DOTANOC showed the matching distribution of Pb-203 VMT-α-NET with Ga-68 DOTANOC [Figure 1]. In light of limited data, we anticipate that the elementally identical Pb-203 VMT-α-NET peptide is a promising theranostic partner for the imaging with therapeutic Pb-212 VMT-α-NET peptide.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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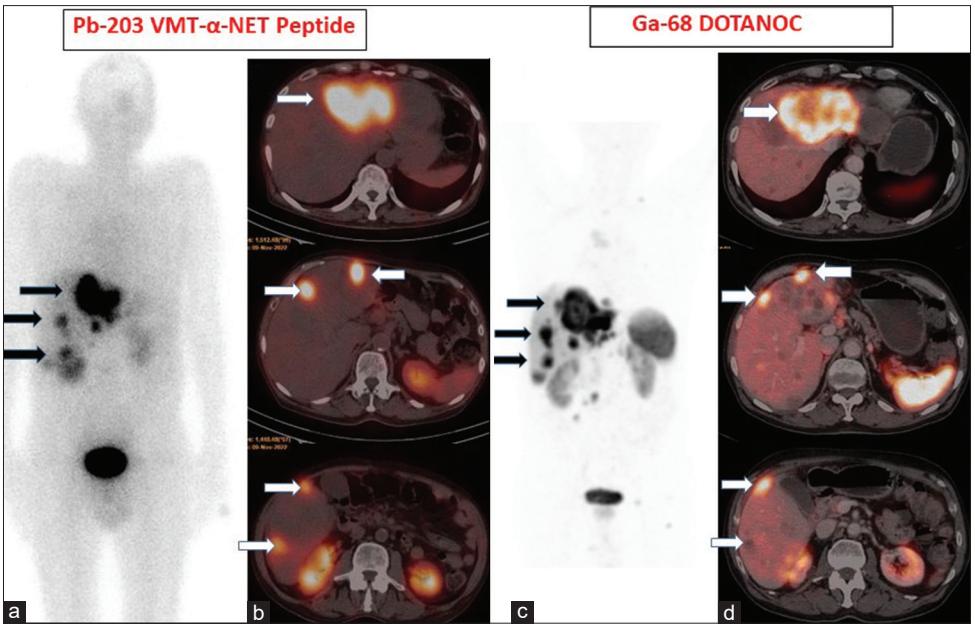

Figure 1: Whole body Planar (a) and transverse SPECT-CT (b) images acquired at 2 h postinjection of 203Pb-VMT-α-NET showed excellent uptake of Pb-203 VMT-α-NET peptide in the liver metastatic sites in a patient of metastatic NET. A comparison with Ga-68 DOTANOC PET/CT scan demonstrated a similar distribution of the tracer in the metastatic liver lesions-Maximum intensity projection (c) and Fused transverse PET/CT slices (d). Solid arrows showing uptake of tracer at the sites of the hepatic metastases. Pb: Lead, NET: Neuroendocrine tumor, SPECT-CT Single-photon emission computed tomography-CT, PET: Positron emission tomography

Conflicts of interest

There are no conflicts of interest.

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