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^{203}Pb-VMT-α-NET Scintigraphy of a Patient With Neuroendocrine Tumor

Dirk Müller, PhD, Hendrik Herrmann, PhD,* Michael K. Schultz, PhD,† Christoph Solbach, PhD,* Thomas Ettrich, MD,‡ and Vikas Prasad, MD**

Abstract: In an end-stage midgut neuroendocrine tumor patient with carcinoid heart disease, right ventricular dysfunction, mildly reduced renal function, and refractory to 6 cycles of ^{177}Lu-HA-DOTATATE therapy, planar, and 22 hours SPECT/CT images were acquired after injection of 224 MBq of ^{203}Pb-VMT-α-NET to assess the feasibility of performing ^{212}Pb-VMT-α-NET therapy. A comparison of the 1.5 and 22 hours SPECT/CT images with ^{68}Ga-HA-DOTATATE PET/CT showed high uptake of ^{203}Pb-VMT-α-NET in liver metastases matching with the results of the PET/CT investigation.

Key Words: ^{203}Pb, ^{212}Pb, VMT-α-NET, Tyr3-octreotide, SPECT/CT

(*Clin Nucl Med* 2023;48: 54–55)

Received for publication May 6, 2022; revision accepted September 15, 2022.

From the *Department of Nuclear Medicine, University of Ulm, Ulm, Germany; †Radiology-Division of Nuclear Medicine, University of Iowa, Iowa, IA; and ‡Clinic of Internal Medicine, University of Ulm, Ulm, Germany.

Conflicts of interest and sources of funding: The author M.K.S. is inventor of the peptide VMT-α-NET and CSO (Chief Science Officer) of Viewpoint Molecular Targeting, Inc. There is no conflict of interest with respect to the other authors. The radiopharmaceutical ^{203}Pb-VMT-α-NET was manufactured under cGMP conditions and applied in accordance with the German National Law (§13 [2b] AMG).

Correspondence to: Dirk Müller, PhD, Department of Nuclear Medicine, University of Ulm, Albert-Einstein-Allee 23, 89081 Ulm, Germany. E-mail: dirk.mueller@uniklinik-ulm.de; Vikas Prasad, MD, Department of Nuclear Medicine, University of Ulm, Albert-Einstein-Allee 23, 89081 Ulm, Germany. E-mail: vikas.prasad@uniklinik-ulm.de.

ISSN: 0363-9762/23/4801–0054
DOI: 10.1097/RLU.0000000000004464

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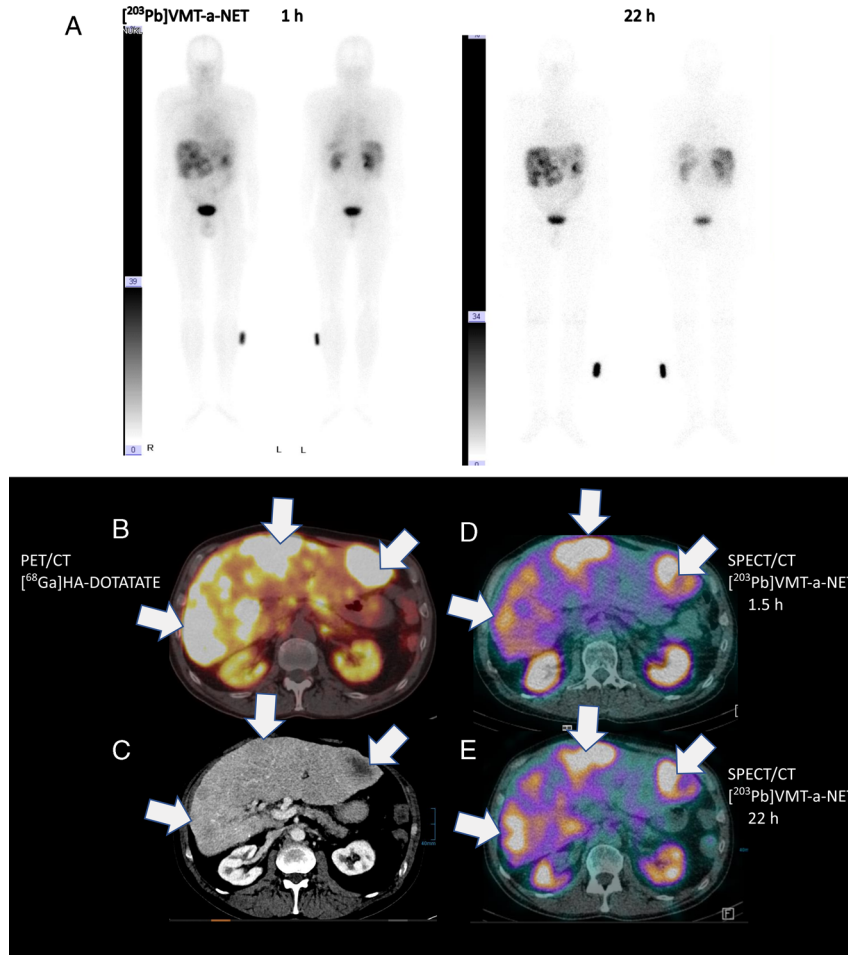

FIGURE 1. Tyr3-octreotide (TOC) variant VMT-α-NET is a novel and ideal ligand for ^{203}Pb/^{212}Pb that shows lower renal excretion, higher neuroendocrine tumor uptake, and high chelation properties for retention of daughter α-particle emitting radionuclide ^{212}Bi. In an end-stage midgut neuroendocrine tumor patient with carcinoid heart disease, right ventricular dysfunction, mildly reduced renal function, and refractory to 6 cycles of ^{177}Lu-HA-DOTATATE therapy, planar, and 22 hours ^{203}Pb-VMT-α-NET SPECT/CT (low dose) images were acquired after injection of 224 MBq of ^{203}Pb-VMT-α-NET to assess the feasibility of performing ^{212}Pb-VMT-α-NET therapy. The patient tolerated the injection without any significant alteration in the vital parameters. There was rapid renal clearance of the tracer within the first hour itself as was evident from tracer excretion in the urinary bladder and in the renal pelvicalyceal system. Because of known right ventricular dysfunction, there was evidence of blood pool activity in the heart, which however decreased significantly after 21 hours. A comparison of the 1.5 and 22 hours SPECT/CT images with ^{68}Ga-HA-DOTATATE PET/CT images (contrast-enhanced diagnostic CT) showed high uptake of ^{203}Pb-VMT-α-NET in liver metastases matching with the results of the PET/CT. **A**, Anterior and posterior planar images acquired at 1 and 22 hours. **B**, Fused ^{68}Ga-HA-DOTATATE PET/CT transverse slice. **C**, Transverse contrast-enhanced CT image. **D** and **E**, SPECT/CT (low-dose) fused transverse slice. Arrows are showing the liver metastases.[1–8]