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IMAGE OF THE MONTH

Al^{18}F-NOTA-octreotide: first comparison with ^{68}Ga-DOTATATE in a neuroendocrine tumour patient

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^{68}Ga-DOTA-peptide (^{68}Ga-DOTATATE/-TOC/-NOC) PET is the current standard for somatostatin receptor imaging in neuroendocrine tumour (NET) patients, but suffers from practical, regulatory and economical barriers associated with ^{68}Ge/^{68}Ga-generators [1, 2]. A promising alternative, Al^{18}F-1,4,7-triazacyclononane-1,4,7-triacetate-octreotide (Al^{18}F-NOTA-octreotide; Al^{18}F-OC), produced using the Al^{18}F-method, combines the advantages of a chelator-based radiolabelling method with the imaging and logistical advantages of fluorine-18, such as higher production yield, longer half-life allowing for centralised production and distribution, and improved spatial resolution due to the shorter positron range of fluorine-18 [3]. We present images of the first patient in our prospective clinical study (NCT03883776), a 53-year-old male, diagnosed with diffuse metastases of a rectal NET. A whole-body PET was performed 2 h after injection of 374 MBq (4 MBq/kg) Al^{18}F-OC. The patient's previous routine clinical ^{68}Ga-DOTATATE PET (199 MBq injected activity, acquisition 30 min post-injection) was performed 5 weeks earlier. Scans were acquired on the same integrated Siemens Biograph 40 Truepoint PET/CT system (both 4 min per bed position). Maximum-intensity projection images with both tracers are comparable, showing diffuse liver metastases and several bone and lymph node metastases. The hottest lesion was in the liver with an SUV_{max} of 50.9 and tumour-to-background ratio (TBR) of 9.9 using Al^{18}F-OC, compared to 57.3 and 8.9 with ^{68}Ga-DOTATATE, respectively. The hottest bone lesion had an SUV_{max} of 27.5 and TBR of 24.5 with Al^{18}F-OC versus 22.0 and 21.0 with ^{68}Ga-DOTATATE. Multiple smaller lesions show improved contrast on Al^{18}F-OC. There was no evidence of in vivo defluorination. Our observation is concordant with the first patient experience with Al^{18}F-OC, where high tumour uptake and TBR were reported [4].

The Al^{18}F-method is a promising labelling strategy and Al^{18}F-OC is a potential clinical alternative for ^{68}Ga-DOTA-peptides without need for ^{68}Ge/^{68}Ga-generators. Further head-to-head comparison is warranted.

This article is part of the Topical Collection on Image of the Month.

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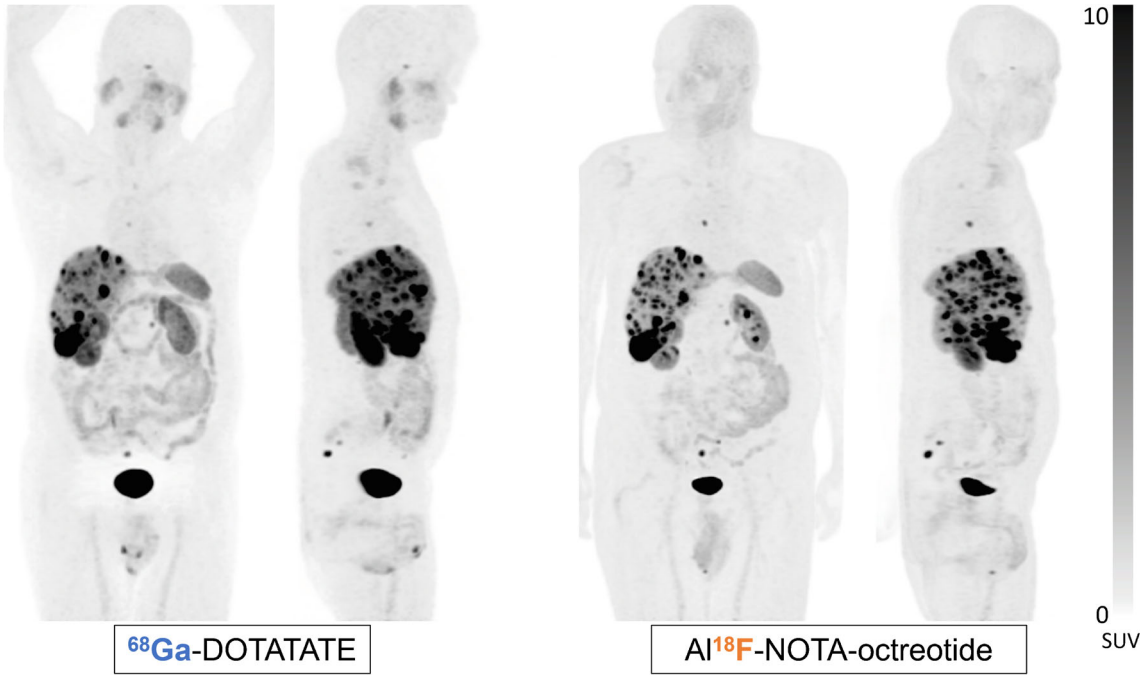

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Compliance with ethical standards

Conflict of interest Eric Van Cutsem has received research grants and personal fees for consultancy from Amgen, Bayer, Boehringer Ingelheim, Celgene, Ipsen, Lilly, Roche, Merck Sharp & Dohme, Merck KGaA, Novartis, Roche and Servier. Chris Verslype has received research grants and performed consultancy services for Novartis and Ipsen. Koen Van Laere has performed consultancy services and contract research through KU Leuven for GE Healthcare, Merck, Janssen Pharmaceuticals, UCB, Syndesi Therapeutics and Eikonizo. Guy Bormans has performed funded contract research with Eikonizo, Merck, Celgene, Janssen Pharmaceuticals and UCB. Christophe M. Deroose has been a consultant for Novartis, Terumo, AAA, Ipsen, Sirtex, and Bayer outside the scope of the submitted work. There are no other conflicts of interest.

Ethical approval All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (Ethische Commissie Onderzoek UZ/KU Leuven S61727) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the prospective clinical study (NCT03883776), including the patient presented in this case report. A separate consent from the patient was obtained for publication of the case report.

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