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IMAGE OF THE MONTH

Cholecystokinin-2 receptor targeting by [^{68}Ga]Ga-DOTA-MGS5 PET/CT in a patient with extensive disease small cell lung cancer

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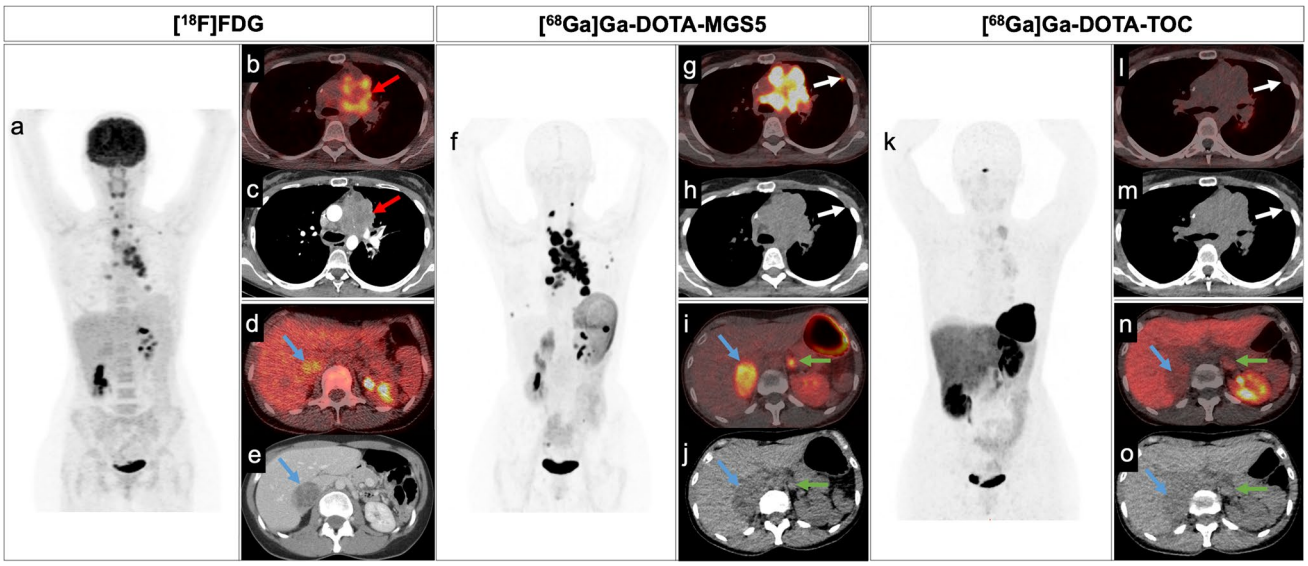

The cholecystokinin-2 receptor (CCK2R) is expressed on various cancer types including small cell lung cancer (SCLC) [1, 2]. Recently, radiolabelled CCK2R-targeting peptides have shown promising results in medullary thyroid carcinoma [3, 4]. We used the minigastrin analogue DOTA-DGlu-Ala-Tyr-Gly-Trp-(N-Me)Nle-Asp-1-Nal-NH_2 radiolabelled with gallium-68 ([^{68}Ga]Ga-DOTA-MGS5) in a 40 year-old patient with extensive disease (ED)-SCLC who also underwent [^{18}F]FDG (08/2023) and [^{68}Ga]Ga-DOTA-TOC (01/2024) PET/CT. [^{68}Ga]Ga-DOTA-MGS5 PET/CT was performed to evaluate the potential therapeutic option with [^{177}Lu]Lu-DOTA-MGS5.

[^{18}F]FDG PET/CT (a) concentrated in the cervical and mediastinal lymph nodes, the lung tumour and the cervical vertebrae. Inhomogeneous uptake was detected in the mediastinal tumour mass (b) and in the right adrenal gland (d). All lesions were confirmed by contrast-enhanced CT (c,e).

[^{68}Ga]Ga-DOTA-MGS5 PET/CT (12/2023), beyond high tracer uptake in all FDG-avid lesions (f), identified additional abnormal foci in left subpleural lesions (g,h), the right mammary region, both adrenal glands (i,j), gastric curvature and the right pelvis. Bone involvement was seen in the left ileum, right VII rib, and cervical vertebrae. These newly

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detected lesions were not present in the [^{18}F]FDG PET/CT suggesting disease progression. Due to the time interval between [^{18}F]FDG and [^{68}Ga]Ga-DOTA-MGS5 PET/CT scans no direct lesion comparison was performed.

Somatostatin receptor expression as detected by [^{68}Ga]Ga-DOTA-TOC PET/CT (k) was faint in all lesions, also in those clearly visible by low-dose CT (l-o).

Considering the poor prognosis of ED SCLC (5-year survival-rate 10–15% [5]), this case suggests that CCK2R-targeting may provide a new theranostic tool in ED-SCLC patients.

Author contributions Gianpaolo di Santo, Elisabeth von Guggenberg and Irene Virgolini contributed to the study conception and design. Material preparation and data collection were performed by Gianpaolo di Santo, Vladan Martinovic, Dominik Wolf, Andreas Pircher, and Judith Löffler-Ragg. The first draft of the manuscript was written by Gianpaolo di Santo, Giulia Santo and Elisabeth von Guggenberg and all authors commented on previous versions of the manuscript. Anna Sviridenko independently reviewed all the information on the clinical case and checked the correctness of the data. All authors read and approved the final manuscript.

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Data availability Further data about the case are available from the corresponding authors on reasonable request.

Declarations

Ethics approval All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee. Written informed consent was given by the patient prior to the exams together with the permission for anonymized publication of the related medical data. [^{68}Ga]Ga-DOTA-MGS5 was used on a named patient basis and prepared according to the Austrian Medicinal Products Act (AMG §8 and §62).

Competing interests The Medical University of Innsbruck has filed a patent application for minigastrin analogues with "Improved pharmacokinetics and cholecystokinin-2 receptor (CCK2R) targeting for diagnosis and therapy". All other authors have nothing to disclose.

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