

CCK₂ Receptor Ligand [⁶⁸Ga]Ga-DOTA-CCK-66 PET/CT Outperforms [⁶⁸Ga]Ga-DOTATOC PET/CT in a Patient with Small Cell Lung Cancer

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Small cell lung cancer (SCLC) accounts for approximately 15% of all lung cancers and is characterized by an exceptionally high proliferative rate, a strong tendency for early metastasis, and a poor prognosis (1). Cholecystikinin-2 receptor (CCK₂R) is overexpressed in more than half of SCLC cases (2) and offers a potential theranostic target, as demonstrated in a recent report using the CCK₂R-directed compound [⁶⁸Ga]Ga-DOTA-MGS5 (3).

A 69-y-old gentleman with advanced metastasized SCLC was referred for further evaluation of potential radiopharmaceutical therapy (he gave informed consent to publication of this report). Experiencing disease progression after first-line immunotherapy (carboplatin, etoposide, atezolizumab) and subsequent maintenance immunotherapy (atezolizumab), second-line chemotherapy (doxorubicin/cyclophosphamide/vincristine), and third-line (topotecan) chemotherapy, the patient underwent somatostatin receptor-directed PET/CT with [⁶⁸Ga]Ga-DOTATOC (120 MBq; 20 µg; 60 min after injection). Imaging revealed only low to moderate somatostatin receptor expression in the pulmonary, lymph node, hepatic, and osseous tumor manifestations (with a Ki-67 score of ≥90%, as indicated by a mediastinal lymph node metastasis biopsy), rendering somatostatin receptor-directed radiopharmaceutical therapy not favorable. As an alternative, additional PET/CT using [⁶⁸Ga]Ga-DOTA-CCK-66 (190 MBq; 20 µg; 180 min after injection), a recently introduced CCK₂R-targeted tracer (4,5), was performed and exhibited higher tracer uptake in all tumor sites than was seen with [⁶⁸Ga]Ga-DOTATOC (e.g., lung SUV_{max} of 10.4 vs. 6.8, lymph node SUV_{max} of 7.9 vs. 3.7, bone SUV_{max} of 10.0 vs. 2.4, and liver SUV_{max} of 7.8 vs. 4.7; Fig. 1). On the basis of these observations, the patient is currently undergoing pretherapeutic dosimetry with [¹⁷⁷Lu]Lu-DOTA-CCK-66 to determine

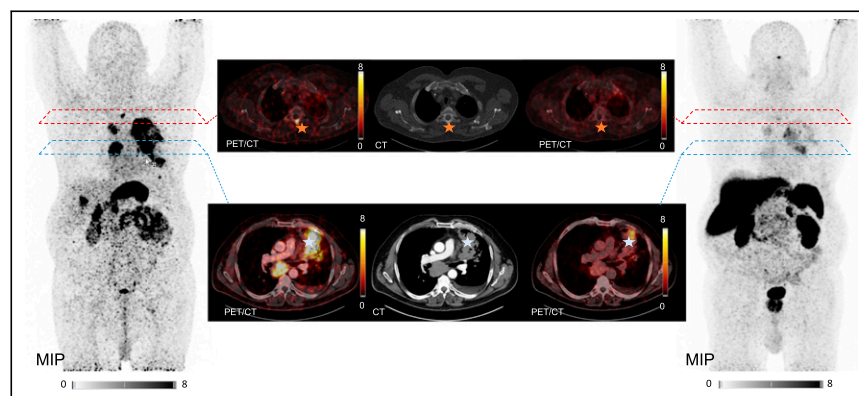


FIGURE 1. Maximum-intensity projections and transaxial slices of [⁶⁸Ga]Ga-DOTA-CCK-66 (left) and [⁶⁸Ga]Ga-DOTATOC (right) PET/CT. Red stars indicate bone metastasis in vertebral arch of second thoracic vertebra. Blue stars indicate pulmonary tumor mass in left upper lobe. Intensity scale bars are SUV. MIP = maximum-intensity projection.

the optimal administered activity for subsequent CCK₂R-directed radiopharmaceutical therapy.

CCK₂R-directed imaging with [⁶⁸Ga]Ga-DOTA-CCK-66 is feasible in SCLC. Given the opportunity for receptor-directed radiopharmaceutical therapy with ⁹⁰Y- or ¹⁷⁷Lu-labeled DOTA-CCK-66, this new tracer might prove a valuable tool in the theranostic armamentarium in SCLC.

DISCLOSURE

A patent application on CCK₂R-targeted compounds was filed (Thomas Günther, Nadine Holzleitner, and Constantin Lapa). No other potential conflict of interest relevant to this article was reported.

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