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Case Report Open access

Intraindividual Tumor Heterogeneity in Neuroendocrine Tumors Revealed with ^{18}F-FDG and ^{68}Ga-DOTA-TATE PET/CT

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Abstract

^{68}Ga-DOTA-TATE PET/CT is widely used in functional imaging of neuroendocrine tumors (NETs) and is superior to conventional somatostatin receptor scintigraphy (SRS), which is recommended for low grade NETs according to NANETS/ENETS guidelines. On the contrary ^{18}F-FDG PET is suggested in patients with high grade NETs or when SRS is negative. However, tumor heterogeneity is a common finding along with NETs and causes differential expression of somatostatin receptor (sstr) and various FDG metabolisms. Here, we present a case where tumor heterogeneity is revealed with combined use of ^{18}F-FDG PET/CT and ^{68}Ga-DOTA-TATE PET/CT in the same patient and how does it influence clinical decision-making Conclusion: We here present the first report of FFF-VMAT achieving a comparable plan quality with less delivery time to that of FF-VMAT and HT in head and neck cancer. FFF-VMAT is a highly efficient and feasible option for the treatment of head and neck cancer in clinical practice.

Keywords: Neuroendocrine tumors; ^{68}Ga-DOTA-TATE PET/CT

Case Report

A 59-year-old female patient was diagnosed with WHO Grade 2 NET (Ki67: %25) by a tru-cut biopsy from a metastatic liver lesions discovered by a CT scan. Initial ^{18}F-FDG PET/CT revealed intensely FDG avid multiple liver lesions with an index lesion measuring 9 × 7 cm (SUVmax:13.5) and FDG avid bone lesions (SUVmax:4.8) consistent with metastases. Other imaging methods and gastrointestinal endoscopies failed to detect primary tumor site.

A follow-up FDG PET/CT, performed 3 weeks after systemic chemotherapy, revealed progression in size and number of lesions with a slightly increase of SUVmax values (from15.2% to 17.2% increase) consistent with progression of metastatic disease. With an interval of 10 days, ^{68}Ga-DOTA-TATE PET/CT was acquired to evaluate treatment option with peptide receptor radionuclide therapy (PRRT). Although liver metastases were intensely FDG avid (Figure 1A) they showed mildly increased or no significant uptake in ^{68}Ga-DOTA-TATE PET/CT (Figure 1B).

Contrarily bone metastasis, which had a lower FDG avidity compared to liver lesions (Figure 1C), showed strongly increased uptake in ^{68}Ga-DOTA-TATE PET/CT (Figure 1D) indicating high expression of sstr2.

^{68}Ga-DOTA-TATE PET/CT was also detected more bone lesions compared to ^{18}F-FDG PET/CT. In light of these findings patient was referred to intra-arterial ^{90}Y-microsphere therapy to control liver metastases. Also 4 courses of PRRT treatment were planned to treat bone metastases.

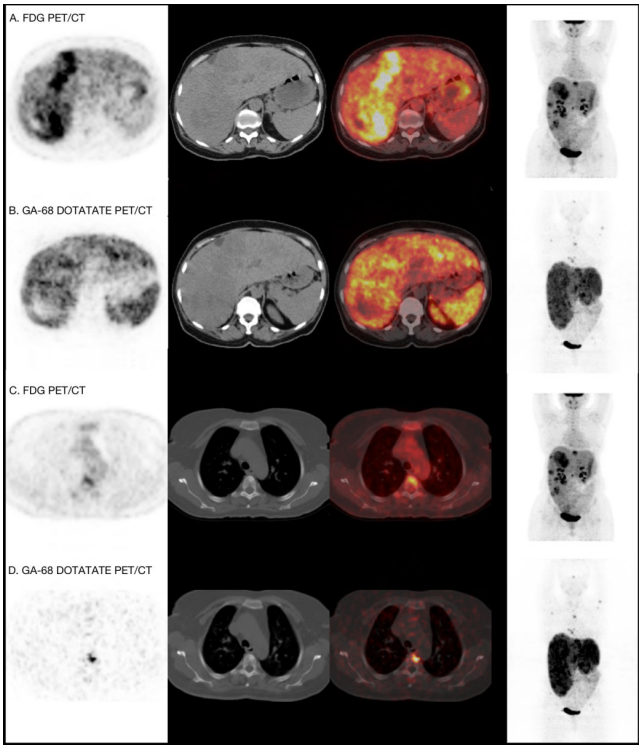

Figure 1: A,C: PET, CT, PET/CT fusion and maximum intensity projection (MIP) images of ^{18}F-FDG PET/CT. B,D: PET, CT, PET/CT fusion and MIP images of ^{68}Ga-DOTA-TATE PET/CT.

^{68}Ga-DOTA-TATE PET/CT is superior to conventional SRS in NETs and also recommended for low grade NETs [1]. However, tumor heterogeneity which can be seen in NETs causes differential sstr expression and various FDG metabolisms [2,3]. This case is a good example of how NETs may show intraindividual tumor heterogeneity and how it effects the selection of treatment choices.

References

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