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OP-655

CCK_2-receptor targeted PET/CT in patients with medullary thyroid cancer using [^{68}Ga]Ga-DOTA-CCK-66 - First clinical experience

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Aim/Introduction: Medullary thyroid cancer (MTC) is a neuroendocrine tumour arising from the parafollicular cells of the thyroid gland and accounts for approximately 5 % of all thyroid cancers. Since patients with MTC can only be cured by complete resection of the primary tumour and any locoregional or distant metastases, accurate imaging techniques for disease staging are required. Recently, cholecystokinin-2 (CCK_2)-receptor has been demonstrated as a suitable target for positron emission tomography/computed tomography (PET/CT) imaging of MTC (1). Here, we report on the first clinical experience with [^{68}Ga]Ga-DOTA-CCK-66, a novel CCK_2R ligand. ***Materials and Methods:*** Eight patients (4 male, mean age 59±13 years) with a history of MTC and elevated tumour marker levels (calcitonin: 125 (13-720) pg/ml, CEA: 2.2 (0.8-6.9) ng/ml) underwent PET/CT imaging with 168±17 MBq [^{68}Ga]Ga-DOTA-CCK-66 for re-staging purposes. In 3 patients additional imaging with [^{18}F]FDG- (n=1) and [^{18}F]F-DOPA-PET/CT (n=2) was available. Tumour detection rates were assessed and compared to tumour marker levels as well as doubling times. ***Results:*** PET imaging was well tolerated by all patients with no adverse effects. CCK_2-positive lesions were detected in 3/8 patients (37.5 %) with local recurrence in one patient, lymph node metastases in three subjects and bone and liver metastases in one patient. The median calcitonin level was higher in the PET-positive group (380 pg/ml vs. 120 pg/ml) and the PET-positive patients had a shorter median calcitonin doubling time before PET/CT imaging (10 months vs. 37 months). In comparison to [^{18}F]FDG, additional lymph node, liver and bone metastases could be detected with [^{68}Ga]Ga-DOTA-CCK-66. In comparison to [^{18}F]F-DOPA the same number of lesions was documented. Apart from tumour lesions, [68Ga]Ga-DOTA-CCK-66 was only found in the CCK_2R-positive stomach as well as in the ureter and the bladder due to excretion. ***Conclusion:*** CCK_2-receptor-directed PET imaging with [^{68}Ga]Ga-DOTA-CCK-66 is feasible, as the compound revealed a favourable biodistribution profile and good detection of tumour lesions. PET positivity is correlated with higher tumor marker levels and shorter doubling times. Further research to investigate a potential diagnostic superiority over already established imaging modalities and to assess the therapeutic option by means of ^{90}Y- or ^{177}Lu-labelled DOTA-CCK-66 are warranted.

References: (1) Refardt J, Hofland J, Kwadwo A, Nicolas GP, Rottenburger C, Fani M, Wild D, Christ E. Theranostics in neuroendocrine tumors: an overview of current approaches and future challenges. Rev Endocr Metab Disord. 2021 Sep;22(3):581-594.