Somatostatin receptor expressing tumors: Imaging with ^{68}Ga-DOTATOC-PET/CT versus ^{111}In-DTPAOC-SPECT/CT

P. Aschoff[1], M. Oeksuez[1], B. Kemke[1], K. Zhernosekov[2], M. Jennewein[2], F. Roesch[2], H. Bihl[1]
[1]Klinik für Nuklearmedizin und PET-Center, Klinikum Stuttgart, D-70022, Stuttgart
[2]Institut für Kernchemie, Johannes Gutenberg-Universität, D-55128 Mainz

Introduction: Imaging of somatostatin-receptor (SSTR) expressing tumors using ^{111}In-DTPA-octreotide (^{111}In-DTPAOC) has proven to be helpful in the detection of SSTR-expressing tumors and their metastases. One of the drawbacks of this method - even if performed in SPECT-technique - is its limited sensitivity in detecting small lesions. ^{68}Ga-DOTA-DPhe(1)-Tyr(3)-octreotide (^{68}Ga-DOTATOC) is a new PET-radiotracer with a higher specific binding to SSTR2 compared to ^{111}In-DTPAOC [1].
This study compares the clinical performance of both methods in detecting SSTR2-positive tumor lesions.

Experimental: Thirty-six patients with metastatic neuroendocrine gastroenteropancreatic tumor were evaluated with both ^{111}In-DTPAOC SPECT/CT (185 MBq) and ^{68}Ga-DOTATOC-PET/CT (50-120 MBq). GE Millennium VG Hawkeye gamma camera and GE Discovery LS PET/CT-scanner were used to perform the respective scans.
400-200 MBq of ^{68}Ga were obtained using a 20 mCi ^{68}Ge/^{68}Ge-generator, based on a TiO_2-phase (Cyclotron Co., Obninsk, Russia). For syntheses of ^{68}Ga-DOTATOC, ^{68}Ga was pre-concentrated and purified on micro-chromatography column filled with Bio-Rad AG 50W-X8 [2].

Results: Whereas ^{111}In-DTPAOC-scintigraphy was performed in a 2-d protocol, ^{68}Ga-DOTATOC-PET/CT generated decisive images of high quality 20 min after injection. 95% of all lesions were already seen 10 min after injection (Fig.1). All "^{111}In-DTPAOC-lesions" were detected with ^{68}Ga-DOTATOC-PET/CT as well and additional lesions (bone, lymphnodes) could be identified in 24/36 patients (67%). In all patients, lesion localisation was significantly more precise with PET/CT than with SPECT/CT.

In this study, ^{68}Ga-DOTATOC-PET/CT turned out to be superior to ^{111}In-DTPAOC-SPECT/CT in the detection of SSTR2-positive tumors and metastases. For clinical practice, it is important that ^{68}Ga-DOTATOC-PET/CT can be performed in a 1-d protocol, i.e. scans will start immediatly after tracer injection (20 min) and will be achieved in about <30 min.

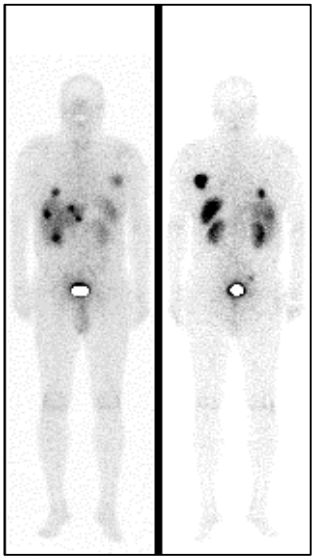
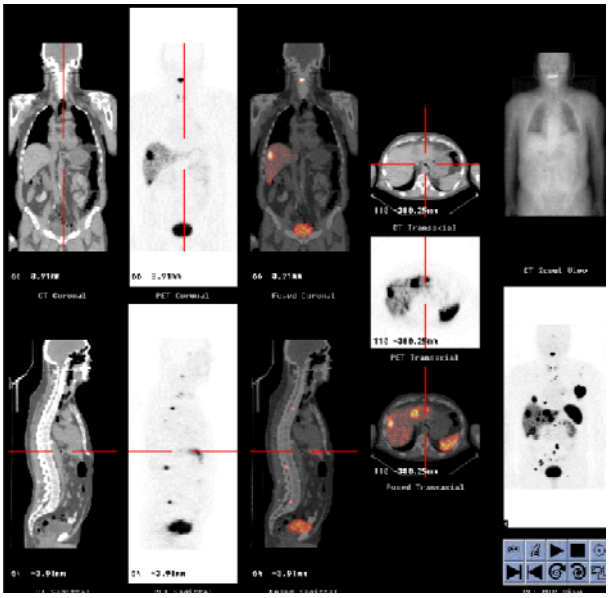


Figure 1

Figure 2



Patient with liver and bone metastasis:
Figure 1) ^{111}In-DTPAOC planar imaging
Figure 2) ^{68}Ga-DOATATOC PET/CT and image fusion of PET/CT

References

[1] Mäcke, H. R., Good, S.: "Radiometals (non-Tc, non-Re) and bifunctional labeling chemistry"; Handbook of Nuclear Chemistry, volume 4, Amsterdam, (2003)
[2] Zhernosekov, K.P. et. al., this report