64Cu-DOTATATE PET for Neuroendocrine Tumors: a Prospective Head-to-Head Comparison with 111In-DTPA-octreotide in 112 Patients

Neuroendocrine tumors (NETs) can be visualized using radiolabeled somatostatin analogs. We have previously shown the clinical potential of (64)Cu-DOTATATE in a small first-in-human feasibility study. The aim of the present study was, in a larger prospective design, to compare on a head-to-head basis the performance of (64)Cu-DOTATATE and (111)In-diethyleneetriaminepentaacetic acid (DTPA)-octreotide ((111)In-DTPA-OC) as a basis for implementing (64)Cu-DOTATATE as a routine.

METHODS:
We prospectively enrolled 112 patients with pathologically confirmed NETs of gastroenteropancreatic or pulmonary origin. All patients underwent both PET/CT with (64)Cu-DOTATATE and SPECT/CT with (111)In-DTPA-OC within 60 d. PET scans were acquired 1 h after injection of 202 MBq (range, 183-232 MBq) of (64)Cu-DOTATATE after a diagnostic contrast-enhanced CT scan. Patients were followed for 42-60 mo for evaluation of discrepant imaging findings. The McNemar test was used to compare the diagnostic performance.

RESULTS:
Eighty-seven patients were congruently PET- and SPECT-positive. No SPECT-positive cases were PET-negative, whereas 10 false-negative SPECT cases were identified using PET. The diagnostic sensitivity and accuracy of (64)Cu-DOTATATE (97% for both) were significantly better than those of (111)In-DTPA-OC (87% and 88%, respectively, P = 0.017). In 84 patients (75%), (64)Cu-DOTATATE identified more lesions than (111)In-DTPA-OC and always at least as many. In total, twice as many lesions were detected with (64)Cu-DOTATATE than with (111)In-DTPA-OC. Moreover, in 40 of 112 cases (36%) lesions were detected by (64)Cu-DOTATATE in organs not identified as disease-involved by (111)In-DTPA-OC.

CONCLUSION:
With these results, we demonstrate that (64)Cu-DOTATATE is far superior to (111)In-DTPA-OC in diagnostic performance in NET patients. Therefore, we do not hesitate to recommend implementation of (64)Cu-DOTATATE as a replacement for (111)In-DTPA-OC.

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