99m Tc-MIP-1404-SPECT/CT for the detection of PSMA-positive lesions in 225 patients with biochemical recurrence of prostate cancer.


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BACKGROUND: 99m Tc-MIP-1404 (Progenics Pharmaceuticals, Inc., New York, NY) is a novel, SPECT-compatible 99m Tc-labeled PSMA inhibitor for the detection of prostate cancer. We present results of its clinical use in a cohort of 225 men with histologically confirmed prostate cancer referred for workup of biochemical relapse.

METHODS: From April 2013 to April 2017, 99m Tc-MIP1404-scintigraphy was performed in 225 patients for workup of PSA biochemical relapse of prostate cancer. Whole-body planar and SPECT/CT images of the lower abdomen and thorax were obtained 3-4 h p.i. of 710 ± 64 MBq 99m Tc-MIP-1404. Images were visually analyzed for presence and location of abnormal uptake. In addition, quantitative analysis of the SPECT/CT data was carried out on a subset of 125 patients. Follow-up reports of subsequent therapeutic interventions were available for 59% (139) of all patients.

RESULTS: Tracer-positive lesions were detected in 77% (174/225) of all patients. Detections occurred at the area of local recurrence in the prostate in 25% of patients (or a total of 56), with metastases in lymph nodes in 47% (105), bone in 27% (60), lung in 5% (12), and other locations in 2% (4) of patients. Detection rates were 90% at PSA levels ≥2 ng/mL and 54% below that threshold. Lesional SUVmax values were, on average, 32.2 ± 29.6 (0.8-142.2), and tumor-to-normal ratios 146.6 ± 160.5 (1.9-1482.4). The PSA level correlated significantly with total uptake of MIP-1404 in tumors (P < 0.001). Furthermore, total tumor uptake was significantly higher in patients with Gleason scores ≥8 compared to those with Gleason scores ≤7 (P < 0.05). In patients with androgen deprivation therapy, the detection rate was significantly higher compared to patients without androgen deprivation therapy (86% vs 71%, P < 0.001). Based on 99m Tc-MIP-1404-imaging and other information, an interdisciplinary tumor board review recommended changes to treatment plans in 74% (104/139) of those patients for whom the necessary documentation was available.

CONCLUSION: SPECT/CT with 99m Tc-labeled MIP-1404 has a high probability in detecting PSMA-positive lesions in patients with elevated PSA. Statistical analysis disclosed significant relationship between quantitative 99m Tc-MIP-1404 uptake, PSA level, and Gleason score.
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**KEYWORDS:** 99mTc-PSMA; PSA relapse; SPECT/CT; absolute quantification; prostate cancer

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