11C-acetate positron emission tomography imaging and image fusion with computed tomography and magnetic resonance imaging in patients with recurrent prostate cancer.

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Abstract

PURPOSE: To assess the clinical value of computed tomography (CT) and magnetic resonance imaging (MRI) image fusion with 11C-acetate (AC) positron emission tomography (PET) imaging for detection and exact location of clinically occult recurrences.

PATIENTS AND METHODS: Fifty prostate cancer patients with elevated/increasing serum prostate-specific antigen levels after radical therapy underwent whole-body AC PET. Uptake was initially interpreted as normal, abnormal, or equivocal. In case of abnormal or equivocal uptake, additional conventional imaging techniques, such as CT, MRI, and bone scans, were performed. To precisely define the anatomic location of abnormal uptake and to improve characterization of equivocal lesions, a software-assisted image fusion (CT-PET, MRI-PET) was performed and evaluated as site-by-site analysis of 51 abnormal (n = 37) or equivocal (n = 14) sites of all 50 patients. In 17 patients, additional histopathologic evaluation was available.

RESULTS: In five (10%), 13 (26%), and 32 (64%) of the 50 patients, AC PET studies demonstrated AC uptake judged as normal, equivocal, and abnormal, respectively. Image fusion changed characterization of equivocal lesions as normal in five (10%) of 51 sites and abnormal in nine (18%) of 51 sites. It precisely defined the anatomic location of abnormal uptake in 37 (73%) of 51 sites. AC PET findings did influence patient management in 14 (28%) of 50 patients.

CONCLUSION: Retrospective fusion of AC PET and CT/MRI is feasible and seems to be essential for final diagnosis. This is particularly true in patients with AC uptake in the prostate region.

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