Carbon-11-acetate positron emission tomography (PET), versus fluorine-18 fluorodeoxyglucose PET and CT for the diagnosis of recurrent prostate cancer after radical prostatectomy in cases of prostate specific antigen of more than 1 to 3ng/mL

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Treatment of recurrent prostate cancer (PC) after radical prostatectomy is based on the site of recurrent disease [1-3]. In a previous study, we showed that carbon-11 acetate positron emission tomography (AC PET) demonstrated marked uptake in 27/46 of PC patients in recurrence after radical prostatectomy (RP), while serum PSA was higher than 3.0ng/mL [4]. In the present paper we studied 11 patients with PC following RP, who had no clinical signs of recurrence, with PSA levels of

Table 1. *Clinical information, follow-up and biopsy findings in Groups I and II*

Case	Group	Age (y)	Follow-up (m)	Gleason score / HG	Biopsy in situ	Treatment	*Outcome*
1	I	75	56	3+3	No malignancy	ET	No relapse
2	I	72	55	3+4	» »	EBRT	» »
3	I	70	54	3+2	» »	»	» »
4	I	63	15	4+3	» »	»	» »
5	I	72	2	3+3	» »	»	» »
6	I	61	1	3+4	» »	»	» »
7	II	61	56	4+2	» »	»	» »
8	II	66	35	moderate	» »	»	» »
9	II	74	31	3+3	» »	»	» »
10	II	69	28	poor	» »	»	» »
11	II	72	42	2+4	Adenocarcinoma	»	» »

HG: histological grade ET: endocrine therapy EBRT: external beam radiation therapy

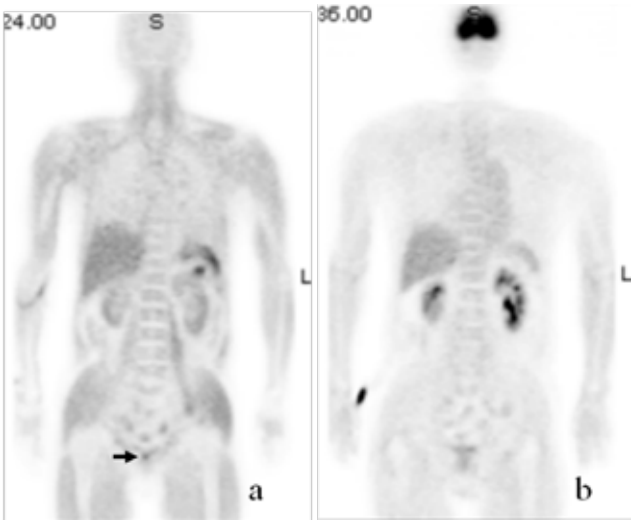

Figure 1. Coronal images of positive AC PET are shown for Patient 11, a 72 years old man of Group B with local recurrence (arrow), serum PSA 1.7ng/mL 3.5 years after RP.

>1.0 or 1.0-3.0ng/mL and under recent hormone treatment. In 6 of these patients who had PSA levels of >1.0ng/mL (Group I) AC PET, ^{18}F-FDG PET scan and separately computerized tomography (CT) scan (GE Advance, GE Healthcare, USA) were all negative for recurrence in situ and for metastatic disease. Transrectal biopsy performed in the prostate bed confirmed the absence of local recurrence (Table 1).

In 5 patients with serum PSA >1-3ng/mL (Group II) we found in all negative results by PET and by CT scans, both for local recurrence and metastases, while the AC PET scan in 3 of them was positive for local recurrence and not for metastases. Thus AC PET was true positive in 1/5 and false negative in 2/5 Group II patients, while ^{18}F-FDG PET and CT scans were false negative and true negative for local recurrence, respectively (Table 1).

This study, which is ongoing, was approved by the Institutional Review Board of our Institute and all patients gave their written informed consent for the study. Clinical information, follow-up and biopsy findings are shown in Table 1.

The age and Gleason score of patients in the three groups were tested with the Kruskal-Wallis test. For correlations between clinical parameters and scan results, the paired t-test was used. For both tests, a probability value<0.05 was considered significant. The mean Gleason scores for RP of Groups I and II were similar (Table 1). Figure 1 shows a patient from Group B. Histological diagnosis showed a Gleason score of 2+4=6 at surgery.

Our results indicated that AC PET had a potential to diagnose one case of recurrent PC in situ and was false positive in 2/5 cases after RP when PSA was between >1-3ng/mL. On the other hand, all patients with PSA under 1.0ng/mL were negative for all tests performed in our study.

There were some limitations to our study. First, we investigated a relatively small number of patients. Secondly, PET/CT scanner was not available in our current study. Independent use of PET scanner without the CT fusion image may fail to evaluate small-volume areas of local uptake in the prostate bed, because high uptake of AC in the rectum hampers accurate assessment of tracer uptake.

In conclusion, AC PET scan in patients with serum PSA between >1-3ng/mL showed one true positive and two false positive cases of prostate cancer recurrence in the prostate bed, while ^{18}F-FDG PET and the CT scans were false negative and true negative, respectively. This study is ongoing in order to better evaluate AC PET.

The authors declare that they have no conflicts of interest.

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