

Evaluation of Gallium-68 PSMA PET/CT for post-prostatectomy biochemical recurrence in comparison to CT abdomen/pelvis and bone scan

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INTRODUCTION

Prostate specific membrane antigen (PSMA) is a transmembrane protein expressed in most prostate cancers, thereby presenting a unique imaging target for the detection of prostate cancer recurrence.

The aim of this study is to evaluate the use of Gallium-68 PSMA PET/CT, compared to conventional CT abdomen/pelvis and bone scan, for detection of local or distant metastasis following biochemical failure/recurrence in post-prostatectomy patients.

METHOD

We conducted a retrospective analysis of our institutional prospectively maintained database between February 2015 to August 2017 to identify patients with biochemical recurrence (BCR) who underwent PSMA PET scans, CT abdomen and pelvis (CTAP) and whole body SPECT bone scan (BS) following radical prostatectomy for prostate cancer.

The results of the 3 imaging modalities were analysed for their ability to detect local recurrence and distant metastases. A SUV maximum of 2.6 in locations not associated with physiologic or reactive uptake on PSMA PET was deemed consistent with a positive scan.

RESULTS

A total of 384 patients were identified with a median PSA of 0.465ng/ml (IQR 0.19-2.00ng/ml).

Age (years)	
Mean	68
Range	46-88
PSA level (ng/ml)	
Mean	2.05
Range	0.01-36.0
Years since Radical Prostatectomy	
Mean	5 years
Range	Within 12 months – 22 years
Gleason Score (n)	
6	15/391 (3.84%)
7	189/391 (48.34%)
8-10	135/391 (34.53%)
No Gleason Score available	52/391 (13.3%)

Table 1 (L). Patient demographics Table 2 (R). PSMA vs CT/BS local recurrence

	CT and BS distant negative	CT and BS distant positive	Total
PSMA distant negative	289	25	314
PSMA distant positive	16	54	70
Total	305	79	384

Table 3 (L). PSMA vs CT/BS distant recurrence Table 4 (R). PSMA vs CT/BS overall recurrence

	CT and BS negative local	CT and BS positive local	Total
PSMA negative local	293	11	304
PSMA positive local	19	61	80
Total	312	72	384

	CT and BS negative overall	CT and BS positive overall	Total
PSMA negative overall	119	21	140
PSMA positive overall	94	150	244
Total	213	171	384

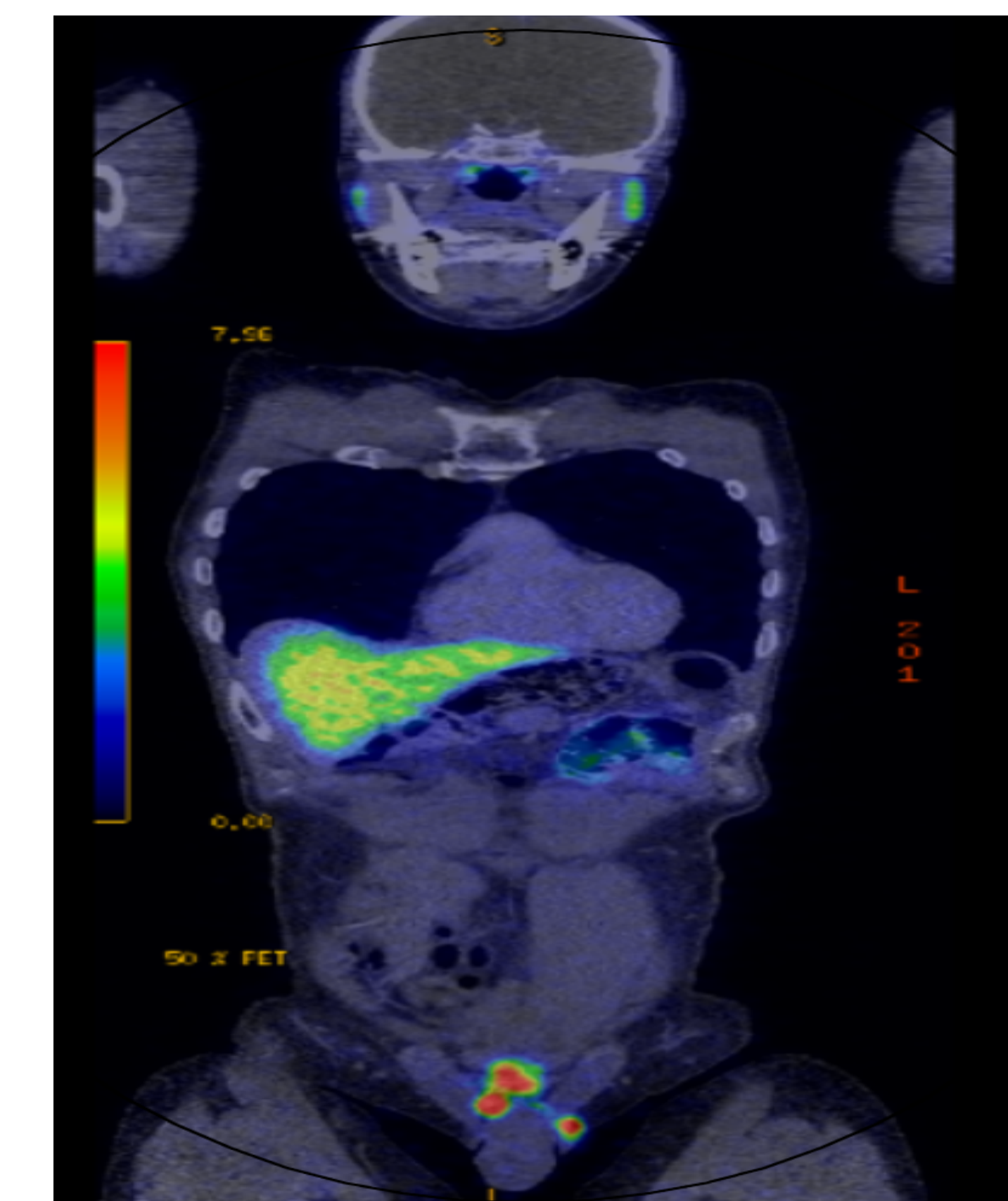


Figure 1. 68yo male with rising PSA on a background of radical prostatectomy in 2010 who was referred for re-staging. 68-Ga PSMA PET/CT demonstrated five foci of avid PSMA positivity in the base of the penis/scrotum in keeping with residual neoplastic disease.

CONCLUSIONS

The use of PSMA has a higher detection rate of predicted local or distant metastasis compared to CTAP and BS in the post-operative staging of biochemical recurrences after radical prostatectomy.

Further studies are needed to evaluate the true sensitivity and specificity of PSMA in identification of local and distant metastatic disease in the post-prostatectomy setting.