Identifying the pathological predictors of PSMA avidity
Comparison of preoperative locoregional Ga-68 PSMA PET-CT results with radical prostatectomy histopathology

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Introduction

The use of Ga-68 PSMA PET/CT for primary staging of prostate cancer has increased significantly in the past few years. The majority of PSMA PET/CT literature are performed on patients with biochemical recurrence post primary treatment for prostate cancer and suffer from a lack of histopathological correlation and retrospective study design.

Aim

To compare the performance of PSMA PET/CT to radical prostatectomy histopathology to determine the pathological predictors of PSMA PET/CT detection

Methods

- Prospectively maintained Uro-pathological database

- Patients included who had a PSMA PET/CT prior to radical prostatectomy between Jan 2019-Sept 2019.

- For each tumour foci correlation between histopathological results and PSMA PET/CT

- PSMA PET/CT prediction of extracapsular extension, seminal vesicle invasion and lymph node involvement was also correlated to histopathological results

- Data was analysed using IBM SPSS 24.0.

Figure 1: Example of correlation between PSMA PET/CT (left panel) and radical prostatectomy specimen (right panel) with a benign transitional nodule (*) indenting the tumour (SUV 40.6, Gleason 4+4=8)
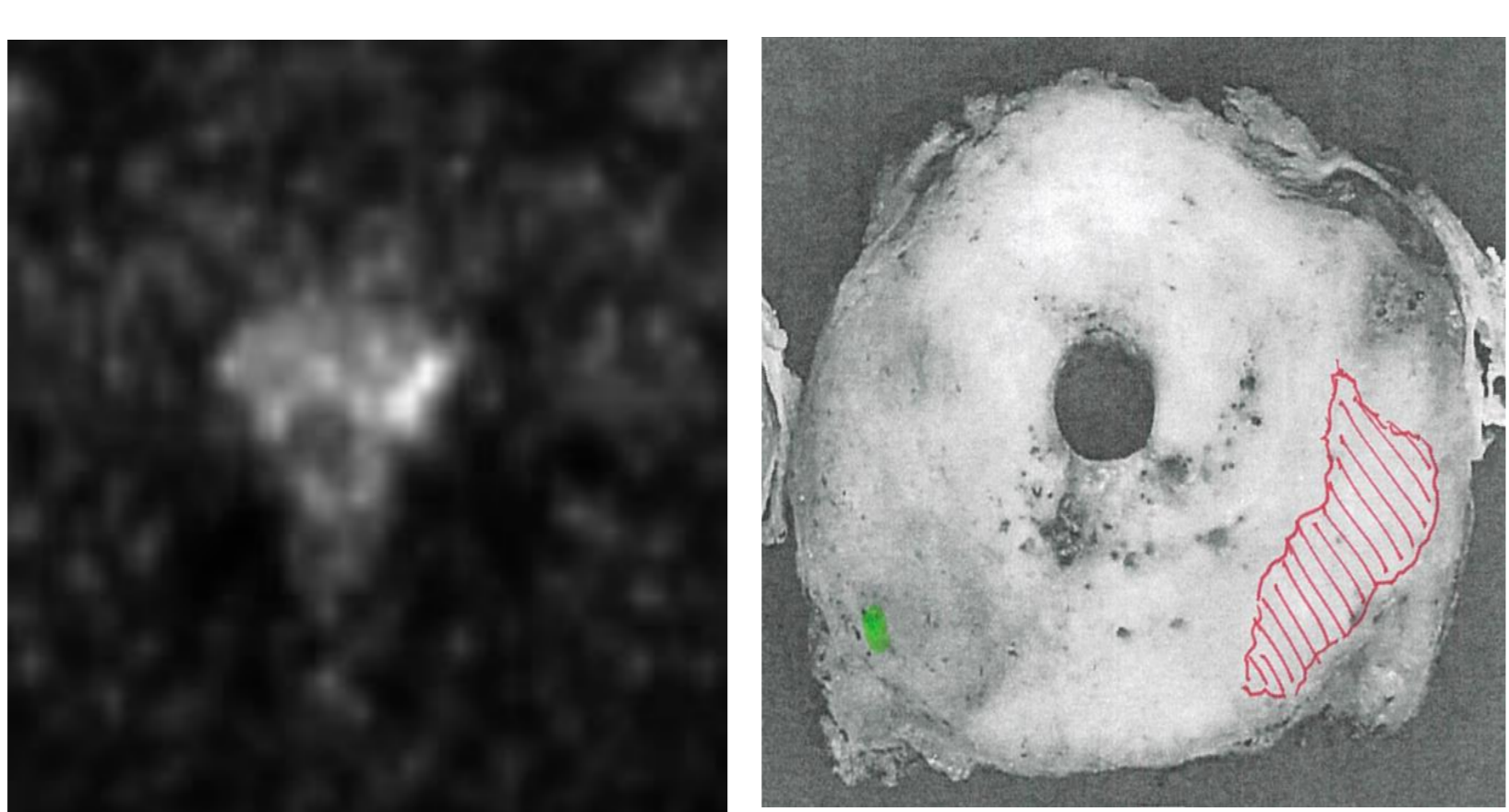
Figure 2: example of a case where PSMA PET/CY (left panel) identified the Index lesions (red lesions, SUV 6.9, Gleason 4+4=8) but did not detect the secondary lesion (green lesion, Gleason 3+3=6)

Results

29 lesions were available for analysis.

Predictors of detection on PSMA PET/CT were:

- Index lesion (100% vs. 12%), p<0.001

- ISUP score 2 or greater, p<0.001

- Tumour maximum dimension: 21.5mm vs. 5.4 mm (detected vs. undetected lesions), p<0.0001

- Tumour volume: 3.2cc vs. 0.18cc (detected vs. undetected lesions), p<0.001
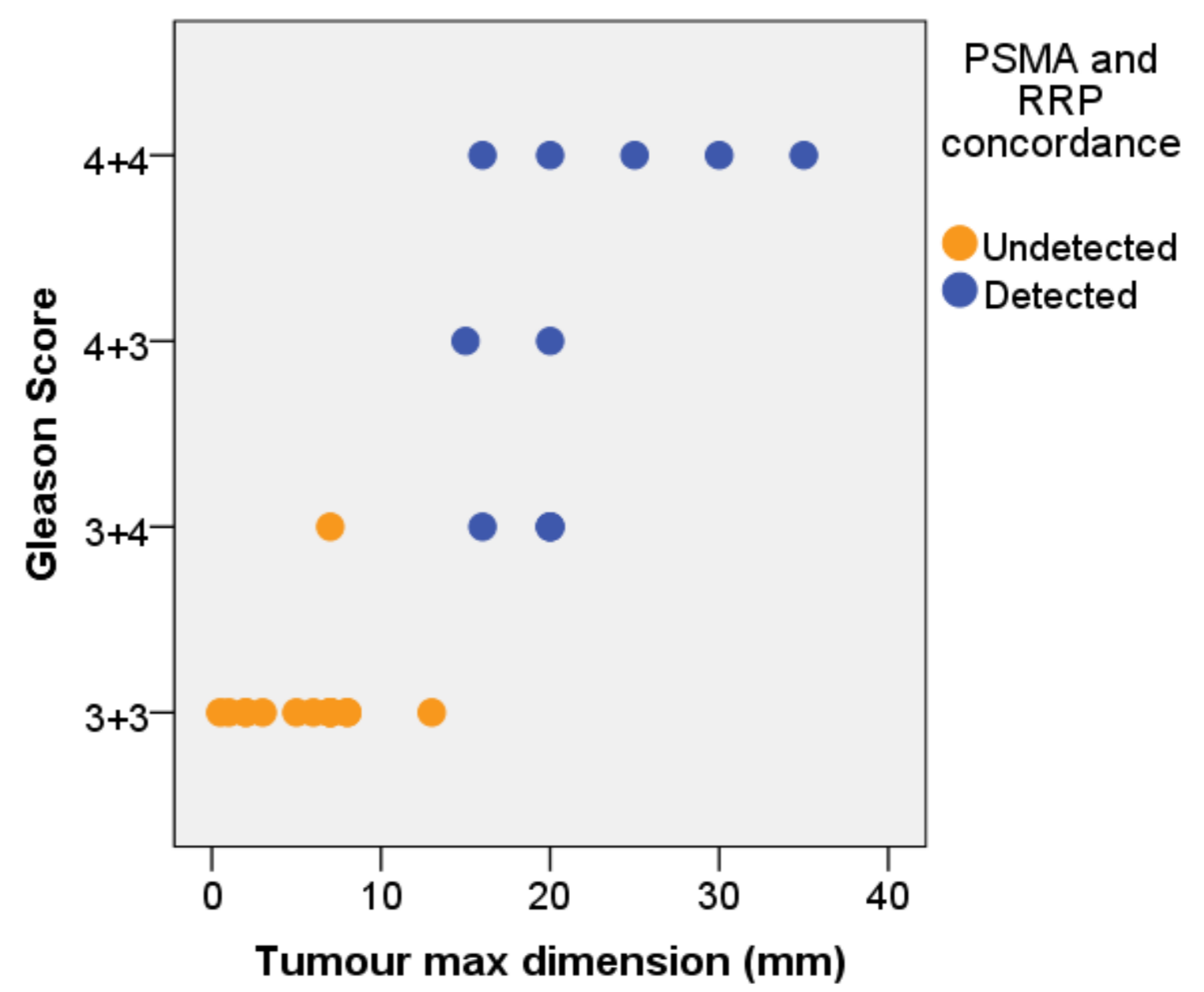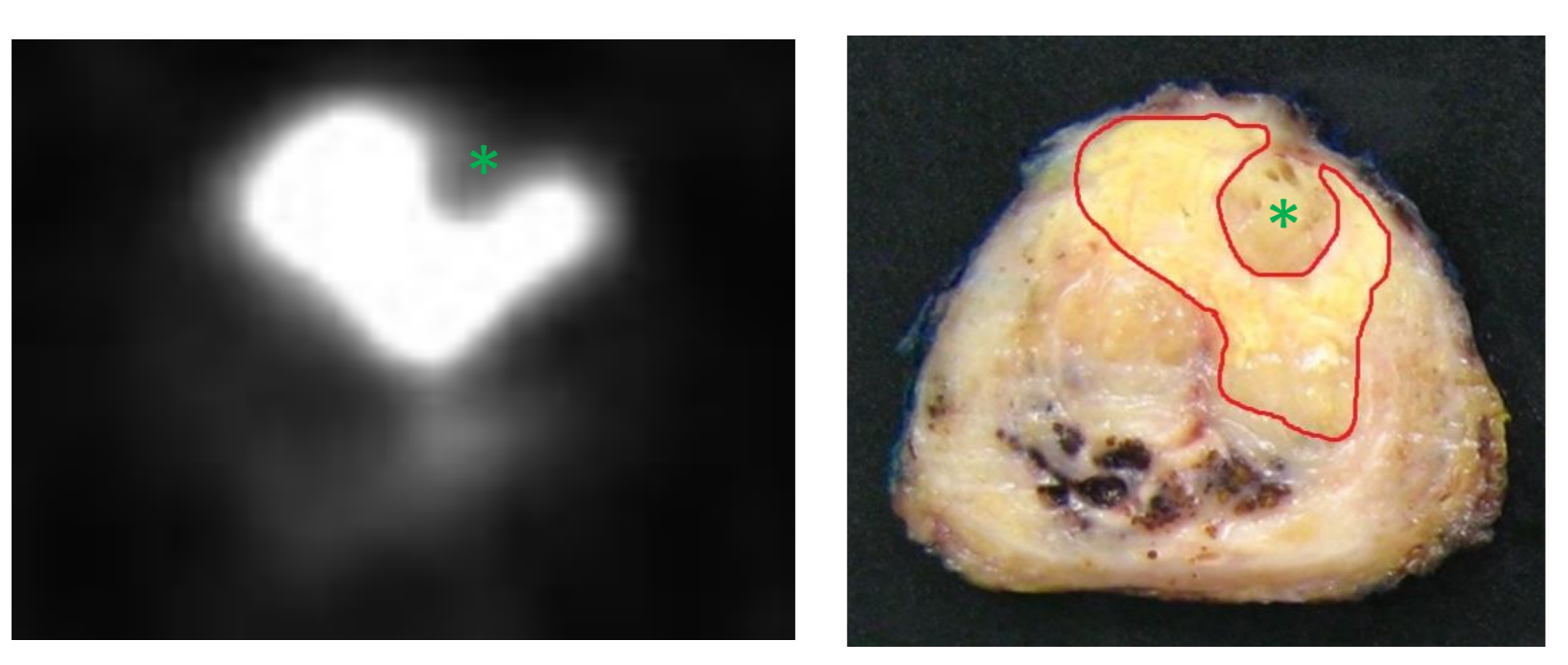

Figure 3: Relationship between Gleason score and tumour maximum dimension for prediction of PSMA avidity

Table 1: Secondary analysis of PSMA PET/CT performance for predicting extracapsular extension (ECE), seminal vesicle invasion (SVI) and lymph node involvement

	Sensitivity	Specificity	PPV	NPV
ECE (8/12)	0.5	1	1	0.5
SVI (4/12)	0.5	1	1	0.8
Lymph nodes (3/12)	0.3	0.8	0.3	0.8

Conclusions

PSMA PET/CT has excellent performance for detecting significant prostate cancer lesions. Small insignificant lesions are not detected by PSMA PET/CT. The performance of PSMA PET/CT for ≥pT3 disease and lymph node involvement has a high specificity but low sensitivity.

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