

Use of PSMA PET/CT to assist patient selection for focal therapy.

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Background

- Focal therapy (FT) is an emerging treatment option for localised prostate cancer, with potential to reduce side effects associated with traditional curative therapies.
- Patient selection is critical for FT success. Prostate biopsy and MRI form the standard diagnostics for selection of patients for FT, yet 21% of patients fail FT (1).
- PSMA-PET offers a valuable adjunct to current diagnostics, with diverse clinical utility (2).

Aim

- We aimed to evaluate the addition of PSMA PET/CT to the current diagnostics in 1) detecting index prostate lesions and 2) excluding significant out-of-field lesions in selecting for FT.

Method

- We performed retrospective analysis on 231 patients who underwent a radical prostatectomy (RP) and preoperative MRI, PSMA PET/CT, transperineal (TP) prostate biopsy between 2015 to 2023.
- Standard of care (SOC) for FT was defined according to a Delphi consensus (3): PSA <10 ng/ml, International Society of Pathology (ISUP) grade ≤ 3 and cancer foci <1.5ml or <3ml localised to one hemi-gland on MRI.
- RP specimens were defined eligible for FT with a single favourable lesion and ISUP ≤ grade 3.
- Sensitivity and specificity analyses were performed using RP histopathology as the gold standard.
- PSMA-PET positivity was defined as radiologically reported PSMA uptake.

Results

- 231 patients underwent RP
- 60 patients met the Delphi FT criteria prior to RP
 - Median age was 66.7 years
 - Median PSA of 5.2 ng/ml (IQR 3.4-6.5)
 - Median prostate volume 30cc
 - Prostate cancer grading of index tumour lesions at TP biopsy were ISUP 1 (n=4), ISUP 2 (n=39), ISUP 3 (n=17)
- The addition of PSMA identified focal lesions in 57 patients, with a median SUVMax 4.2 (IQR 3.3-5.8)
- Of these 60 patients, 40 (66.6%) had discordant index tumour characteristics pre-operatively and on final RP histopathology.

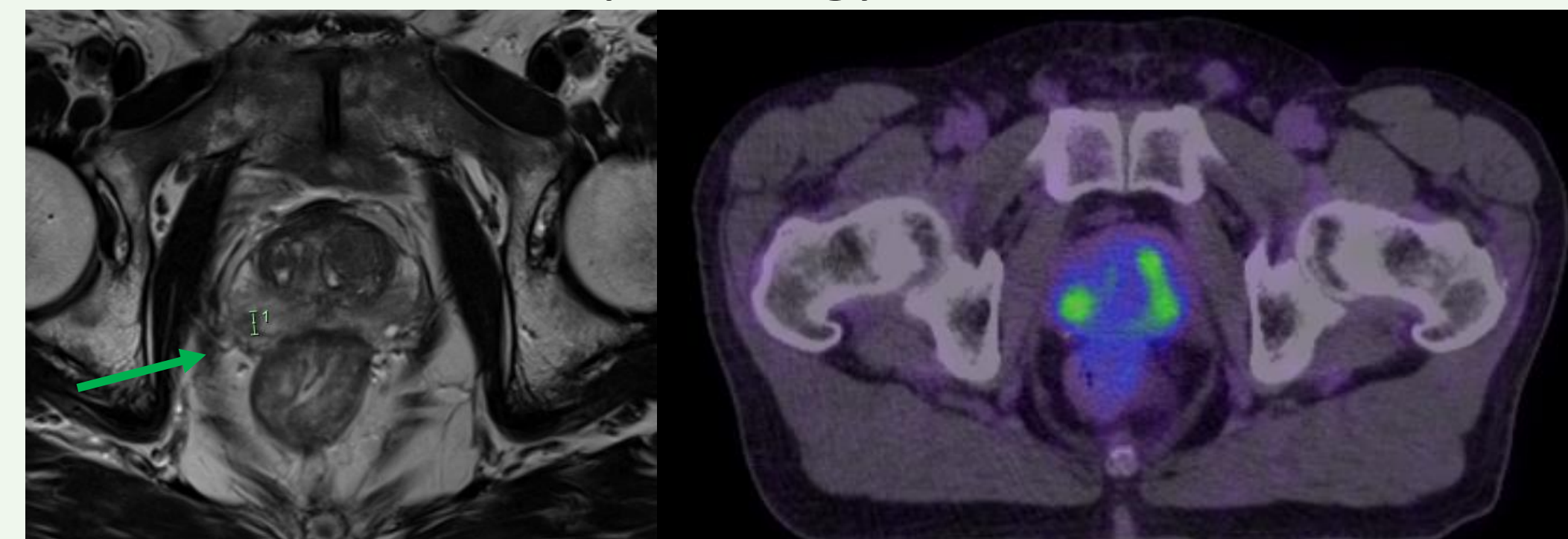


Figure 1: Example of missed out-of-field lesion, with focal lesion identified on T2 MRI imaging at right posterolateral peripheral zone, compared to multifocal PSMA uptake on PSMA PET

The addition of PSMA to FT Delphi selection criteria:

- Increased specificity of appropriate patient selection from 80.3% to 89.7% and increased PPV from 33.3% to 46.2%
- The addition of PSMA increased sensitivity of out-of-field lesion detection to 75.5% from 55.8%

Discordant findings	Number of patients (%)
Bilateral hemi-gland involvement	80
Greater than 3ml index tumour volume	12.5
Extraprostatic extension	7.5

Table 1: Number of FT eligible patients and reasons for discordant findings between pre-operative index tumour characteristics and RP histopathology

	Delphi criteria (%)	Delphi criteria with addition of PSMA (%)
Sensitivity	71.4	64.3
Specificity	80.3	89.7
Positive predictive value	33.3	46.2
Negative predictive value	96.3	94.8

	Delphi criteria detecting out-of-field (%)	Addition of PSMA (%)
Sensitivity	55.8	75.5
Specificity	91.2	67.6
Positive predictive value	93.8	84.8
Negative predictive value	46.3	53.5

Table 2: Analysis of appropriate patient selection and detection of out-of-field lesions with Delphi selection criteria compared to Delphi criteria with the addition of PSMA

References

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Conclusion

- The current FT diagnostics criteria underestimate tumour volumes and bilateral disease.
- The addition of PSMA PET/CT to the current FT diagnostics improved characterisation of the index tumour and improved detection of out-of-field significant tumours.
- The addition of PSMA may be a beneficial diagnostic tool to optimise patient selection for FT.