Use of PSMA PET in metastatic Castration-Resistant Prostate Cancer (mCRPC)

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Background:

- Prostate-specific membrane antigen (PSMA) PET imaging has demonstrated greater sensitivity than conventional imaging with CT and whole-body bone scan (WBBS) in the detection of metastatic prostate cancer[1,2].
- Despite limited supporting data, PSMA PET is increasingly performed for initial staging in patients with mCRPC.
- Given the recent approval of novel therapeutic agents for non-metastatic (M0) CRPC based on conventional imaging, PSMA PET use may influence the M0 population and use of these therapies[2].
- Our study examines the real-world use of PSMA PET imaging in Australian patients with CRPC.

Methods:

- The multi-centre electronic CRPC Australian database (ePAD) was interrogated to identify patients who underwent PSMA PET/CT prior to first line systemic therapy for mCRPC.
- Metastatic site groups (defined as pelvic lymph nodes (LN), distant LN, bone, and visceral) detected on each PSMA PET, concurrent CT and WBBS were recorded following review of imaging reports.
- Descriptive statistics were used to report frequency of use and results of each imaging modality.

Results:

- Of 603 eligible patients diagnosed with mCRPC between 2013 and 2019, 90 (15%) had undergone PSMA PET imaging prior to initial therapy for mCRPC.
- The proportion of patients diagnosed with mCRPC undergoing PSMA PET imaging has increased over time (Figure 1).

FIGURE 1: PSMA PET USE OVER TIME

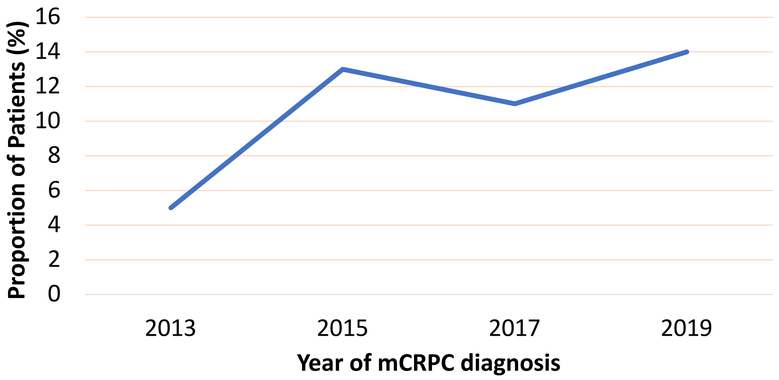
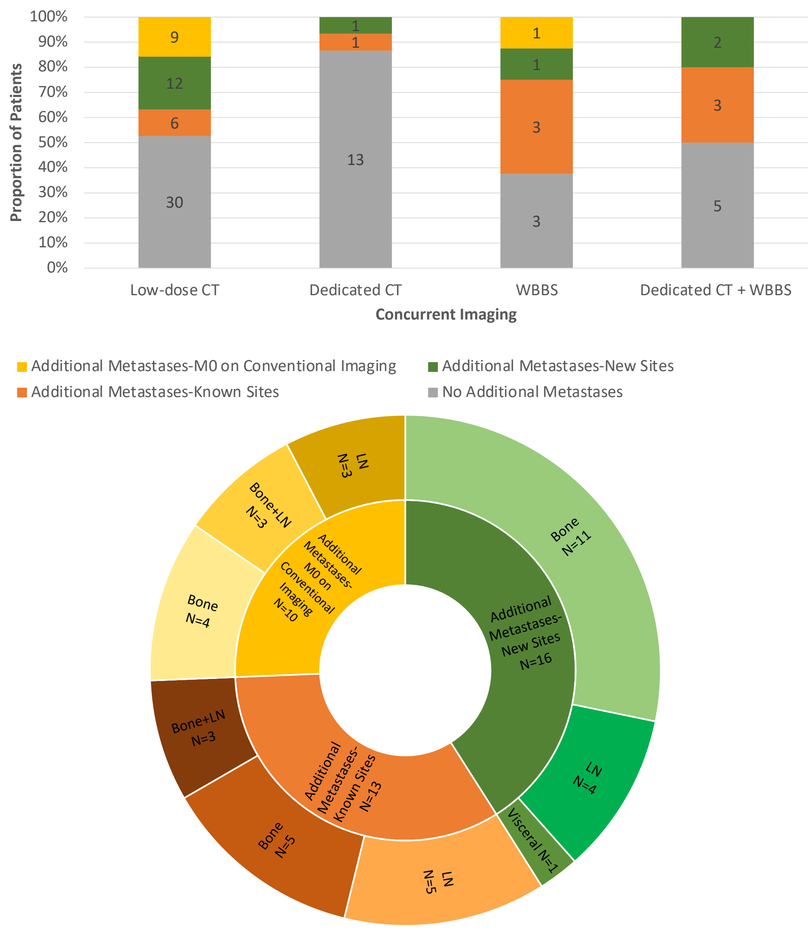


TABLE 1: BASELINE CHARACTERISTICS	
Median Age at CRPC (years)	69 (Range 44-92)
Median PSA at CRPC (ng/ml)	6.8 (Range 0.01-439.6)
CONCURRENT IMAGING WITH PSMA PET	
Dedicated CT	15 (17%)
WBBS	8 (9%)
Dedicated CT and WBBS	10 (11%)
Low dose CT	57 (63%)
SITES OF METASTASIS BY PSMA PET	
Bone only	21 (23%)
Bone and LN	29 (32%)
LN only	28 (31%)
Visceral	12 (13%)

FIGURE 2: ADDITIONAL SITES OF METASTASES ON PSMA PET IMAGING



- Baseline characteristics are reported in Table 1.
- The majority of patients underwent concurrent low dose CT (63%) with PSMA PET, without dedicated CT or WBBS (Table 1).
- PSMA PET identified additional metastases in 39 (43%) patients, that were not identified in available conventional imaging (Figure 2).
- Twenty-six patients (29%) were found to have disease in additional metastatic site groups, most commonly bone (N=14) or LN (N=7).
- Thirteen patients (14%) had additional metastases identified on PSMA PET in known sites of metastases from conventional imaging.
- Ten (11%) patients had M0 disease on conventional imaging but mCRPC on PSMA PET; 9 subsequently commenced systemic therapy.
- In the M0 patients, metastases on PSMA PET included bone (N=4), pelvic and distant LN (N=3), bone and LN (N=3).
- Of those who underwent dedicated CT and WBBS, 5 (50%) demonstrated additional metastases on PSMA PET, including only 2 within a new site group (bone N=1; LN N=1).
- One additional visceral metastasis (liver) was detected on PSMA PET in a patient who only underwent concurrent low-dose CT.

Conclusion:

- In our real-world cohort, the use of PSMA PET imaging increased over time and was commonly performed without conventional CT and WBBS in patients with mCRPC.
- PSMA PET demonstrated increased sensitivity for detection of metastases, including in 10 (11%) patients who would have had M0 CRPC on conventional imaging.
- However, the additional metastases detected were commonly within known sites of disease or LNs and therefore the influence of PSMA PET findings on clinical management decisions requires further evaluation.

References

[1] Hofman MS, et al. Prostate-specific membrane antigen PET-CT in patients with high-risk prostate cancer before curative-intent surgery or radiotherapy (proPSMA): a prospective, randomised, multicentre study. *Lancet.* 2020 Apr 11;395(10231):1208-1216.

[2]Von Eyben et al. 68Ga-Labeled Prostate-specific Membrane Antigen Ligand Positron Emission Tomography/Computed Tomography for Prostate Cancer: A Systematic Review and Meta-analysis. *European Urology.* 2018. 4(5):686-693

[3] Swami U, et al. Improvement in overall survival with Apalutamide, Darolutamide and Enzalutamide in patients with non-metastatic castration-resistant prostate cancer. *Cancer Treat Res Commun*. 2020 Aug 12 (25):1002-05.

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