EDITORIAL:

^{11}C -acetate PET/CT imaging for detection of recurrent disease following radical prostatectomy or radiotherapy in patients with prostate cancer

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The search for the ideal imaging modality to detect small metastatic deposits has largely remained elusive in the field of prostate cancer. However, functional PET-CT is now guiding us in different directions. ^{11}C-acetate PET/CT imaging was one of the first molecular imaging probes showing promise in clinical studies, along with ^{11}C-choline, and more recently challenged by ^{68}Ga-PSMA-PET/CT.(1-3) So against this background, what does this new study by Esch *et al*(4) presented here offer us?

Let's rewind and focus on where molecular imaging may have an impact in prostate cancer. In primary staging, the potential to accurately identify oligometatstatic disease or even widespread metastatic disease prior to primary gland treatment is clearly advantageous. It may allow for wider treatment fields (extended lymphadenectomy or radiation fields), directed treatment of oligometastatic disease, placement into appropriate cytoreductive trials and in some instances consideration of the use of earlier chemo-hormonal therapy. This study did not ~~really~~ address this important ~~point~~ clinical scenario. Nor did it focus on primary diagnosis - another “holy grail” for imaging more recently dominated by MRI.(5)

The clinical question addressed in this study was whether ^{11}C-acetate PET is able to detect distant metastatic disease in men with PSA relapse after having undergone radical prostatectomy or prostate bed radiotherapy. In other words if distant metastatic disease is found then prostate bed radiation may be futile - although this assumption has not been subjected to high quality trials but would seem logical.

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Also, in the era of oligometastatic disease, treatment (surgery and/or radiation) may be directed at nodal and other deposits to prolong time of systemic therapy such as ADT. So what is the "sweet spot"? Some would state for men having undergone surgery a PSA of 0.2ng/ml places the patient at risk of recurrence, although in clinical practice the level at which investigations are warranted can be as high as 1.0ng/ml. This study found ^{11}C -acetate PET had few positive results below a level of 1.0ng/ml. This is in contrast to a recent meta-analysis of ^{68}Ga-PSMA PET/CT demonstrating positive studies at PSA at or below 0.2ng/ml in 42% of patients.(6)

The other group studied was that of detection of recurrent disease in men having undergone primary radiotherapy, although the numbers were low (6 patients). We know this group of men are often undertreated for salvage treatment, and frequently placed on hormonal therapy. Again, early knowledge of locoregional or distant recurrence is required to allow best case selection and thus avoid futile salvage surgery, and also to know who may benefit from salvage lymphadenectomy and treatment of distant oligometastatic disease if required.

The false positive result for ^{11}C-acetate PET of 24% is notable and concerning. This may lead to unnecessary intervention, or even withholding prostate bed radiation that may have been of benefit. In contrast the false positive rate for ^{11}C-choline and ^{68}Ga-PSMA PET-CT is far lower, although false positive PSMA studies may occur in benign conditions and non-prostate cancer tumours.

It should be acknowledged that a strength of this study was comparative histology in a proportion of patients, allowing true sensitivity and specificity to be determined. This is important information, as it guides correct decision making, and such information is lacking for many other prostate cancer imaging probes, including ^{68}Ga-PSMA where, this data is urgently required.

Overall, this study is important and adds to the rich milieu of available molecular imaging data on staging of possible recurrent or metastatic prostate cancer to date. Current prospective trials exploring ^{11}C-choline, ^{18}F-FACBC, ^{18}F-choline and ^{68}Ga-

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PSMA with MRI and clinical outcomes should provide further insight into the most appropriate molecular imaging technique for staging prostate cancer.

Conflicts of Interest

None

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