

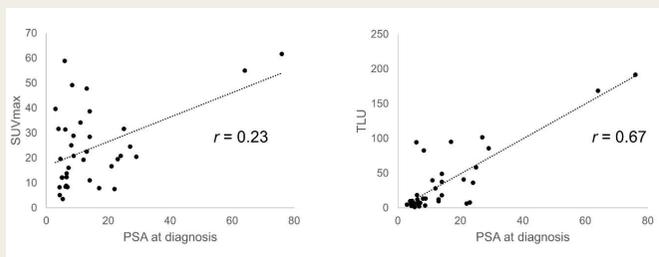
Analysis of [¹⁸F]PSMA-1007 uptake in the prostate gland in prostate cancer patients using histopathology as reference method

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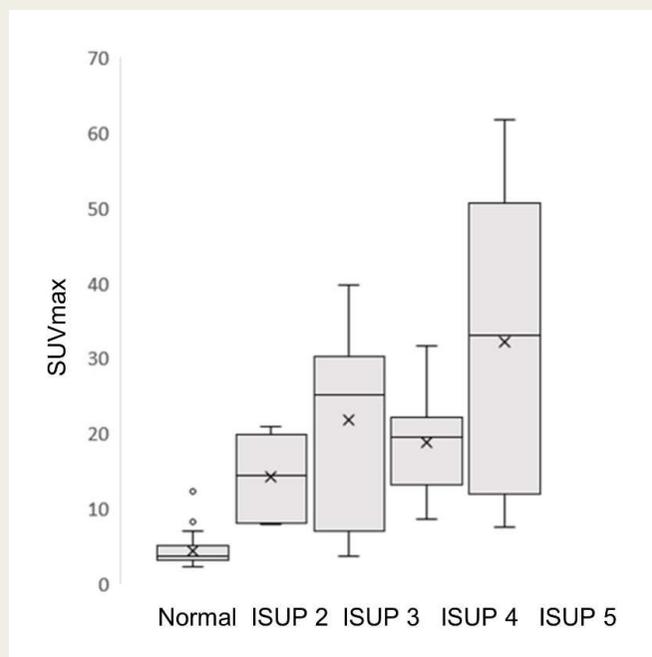
[¹⁸F]PSMA-1007 PET-CT performs well in correctly identifying the index tumour in patients with intermediate to high-risk prostate cancer. Approximately 5% of the index tumors were missed by PET, which agrees with previous studies.

Background

Prostate-specific membrane antigen (PSMA) ligands used with PET-CT are a promising tool for managing patients with prostate cancer. This study aimed to determine the accuracy of [¹⁸F]PSMA-1007 PET-CT for detecting tumours in the prostate gland using radical prostatectomy (RP) specimens as a reference method and to determine whether a correlation exists between [¹⁸F]PSMA-1007 uptake and the International Society of Urological Pathology (ISUP) grade and prostate specific antigen (PSA) levels at diagnosis.



Correlation between PSA at diagnosis and SUVmax of the index tumour (left) and between PSA at diagnosis and TLU of the index tumour (right).



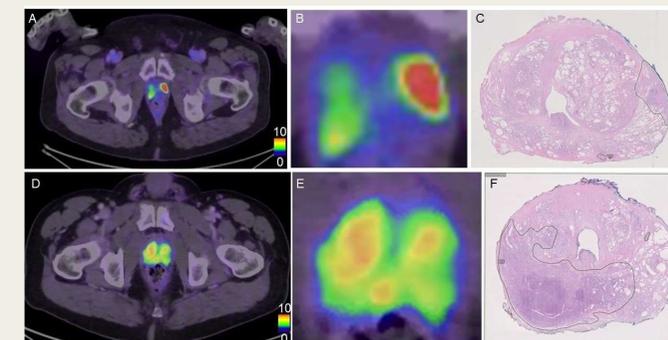
Histograms for SUVmax of normal prostate tissue and the ISUP grades for the index tumours.

Methods

Thirty-nine patients referred for [¹⁸F]PSMA-1007 PET-CT for initial staging and who underwent RP within four months were included. Uptake of [¹⁸F]PSMA-1007 indicative of cancer was assessed and SUVmax and total lesion uptake (TLU) were calculated for the index tumour. Histopathology was assessed from RP specimens. True positive, false negative, and false positive lesions were calculated.

Results

In 94.9% of patients, the index tumour was correctly identified with PET. SUVmax was significantly higher in the tumours vs normal prostate tissue, but no significant differences were found between ISUP grades and SUVmax. There was a poor correlation between PSA at diagnosis and SUVmax ($r = 0.23$) and moderate agreement between PSA at diagnosis and TLU ($r = 0.67$). When all tumours (also non-index tumours) were considered, many small tumours (approx. 1-2 mm) were not detected with PET.



An example of one patient with a true positive tumour on PET (A-C). A: fused PET-CT images of the middle part of the prostate, B: zoomed fused PET-CT image of the prostate, C: the corresponding histopathology slice delineating a tumour in the left part of the prostate with a Gleason score 3.

An example of one patient with a false negative tumour on PET (D-F). D: fused PET-CT image of the apical part of the prostate, E: zoomed fused PET-CT image of the prostate, F: the corresponding histopathology slice delineating a large tumour mainly located in the dorsal right part in the prostate with ISUP grade 3.

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