

**Detection of intraprostatic tumour localisation with <sup>18</sup>F-PSMA PET/CT compared to radical prostatectomy specimens: Is PSMA-targeted biopsy feasible? –the DeTeCT trial–**

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**Introduction & Objectives:** In primary prostate cancer (PCa) patients accurate staging, histologic grading and risk stratification are crucial to guide treatment decisions. <sup>18</sup>F-DCFPyL (<sup>18</sup>F-PSMA) PET/CT has been successfully introduced for (re)staging of PCa. The high specificity of <sup>18</sup>F-PSMA PET/CT for PCa lesions might additionally be used to localise primary PCa. The aim of this study was to assess the diagnostic performance of <sup>18</sup>F-PSMA PET/CT imaging to localize primary PCa, to allow ultimately for PSMA-guided targeted prostate biopsy similarly to mpMRI imaging.

**Materials & Methods:** Twenty patients with intermediate to high-risk PCa were prospectively enrolled prior to radical prostatectomy. Before surgery, all patients underwent <sup>18</sup>F-PSMA PET/CT (120 min post-injection; median dose 315 MBq [range 255-348 MBq]). Two experienced nuclear medicine physicians assessed tumour localisation on PET/CT using a 12 segment model of the prostate (Figure 1). Similar images using a 12 segment prostate model were obtained by the uro-pathologist for the radical prostatectomy specimen. Based on PET/CT imaging an index lesion biopsy advice (2 segments) was given per patient. In this, index lesion size and standardized uptake values (SUVmax) were assessed. Clinically significant PCa (csPCa) was defined as any PCa with Gleason score  $\geq 3 + 4 = 7$ . The biopsy advice based on PET/CT was correlated to final histology in the radical prostatectomy specimen. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) for csPCa were assessed.

**Results:** In 20 evaluated patients, the median initial prostate-specific antigen level was 20.3 ng/ml (range, 3.5 - 54.0). PSMA uptake in the prostate was observed in all patients. Overall, 110 of 240 segments (45.8%) contained csPCa at final pathologic examination. Sensitivity, specificity, NPV and PPV for csPCa per segment using PSMA-PET/CT were 63%, 95%, 82%, and 89%, respectively. The segments recommended for targeted biopsy harboured csPSA in 19/20 patients (95%), and covered the highest Gleason score PCa segment in 18/20 patients (90%) (Figure 1).

**Conclusions:** In this study comparing the localisation of PCa on <sup>18</sup>F-PSMA PET/CT and the radical prostatectomy specimen an accurate detection (95%) and localisation of csPCa was found. PSMA PET/CT adequately localized csPCa potentially allowing accurate PSMA-targeted biopsy.

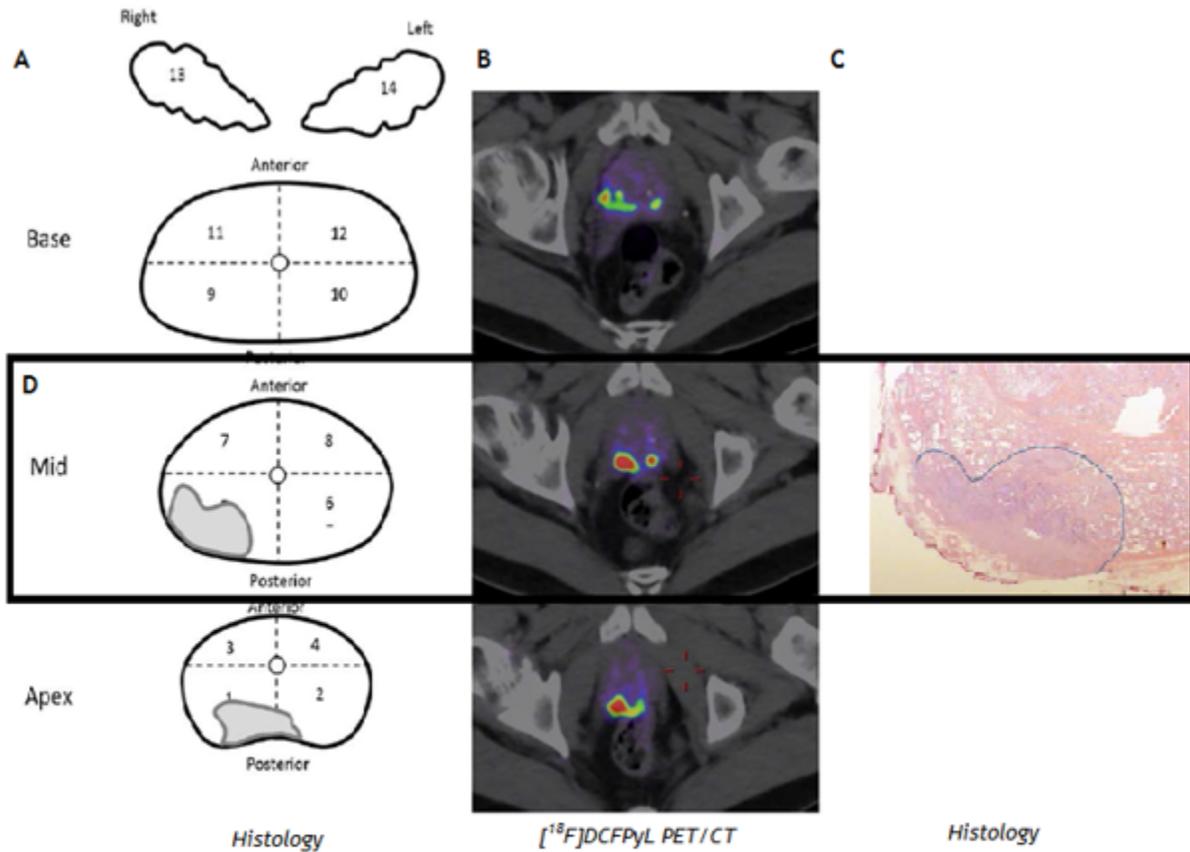


Fig. 1 - A 65-year old patient with a biopsy proven PCa with a Gleason score of 3+4 and an iPSA of 5.6 ng/ml. (A) Schematic drawing of the 12 prostate segments included in the study in the radical prostatectomy specimen (B)  $^{18}\text{F}$ -PSMA PET/CT images show intense focal uptake in the right posterior midgland and apex segments, with extracapsular extension. Based on the highest SUVmax of 6.09 and tumor size, segment 5 is advised for targeted biopsy. (C) histopathology shows a similar tumor focus, in both segment 5 and 1 proven a Gleason 3+4 PCa with extraprostatic involvement (pT3a), hereby confirming the index lesion localisation.