Pelvic Lymph Node Staging with ^{18}F-DCFPyL PET/CT prior to extended Pelvic Lymph Node Dissection in Primary Prostate Cancer - the SALT trial -

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Introduction & Objectives: The detection of lymph-node metastases (N1) with conventional imaging such as Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) is inadequate for primarily diagnosed prostate cancer (PCa). Prostate-specific membrane antigen (PSMA) PET/CT is successfully introduced for the staging of (biochemically) recurrent PCa. Besides the frequently used ^{68}Gallium-labelled PSMA tracers, ^{18}Fluor-labeled PSMA tracers are available. This study examined the diagnostic accuracy of ^{18}F-DCFPyL (PSMA) PET/CT for lymph-node staging in primary PCa.

Materials & Methods: This was a prospective, multicentre cohort study. Patients with primary PCa underwent ^{18}F-DCFPyL PET/CT prior to robot-assisted radical prostatectomy (RARP) with extended pelvic lymph-node dissection (ePLND). Patients were included between October 2017 and January 2020. A Memorial Sloan Kettering Cancer Centre (MSKCC) nomogram risk probability of ≥8% of lymph-node metastases was set to perform ePLND. All images were reviewed by two experienced nuclear physicians, and were compared to post-operative histopathologic results.

Results: A total of 117 patients was analysed. Lymph-node metastases (N1) were histologically diagnosed in 17/117 patients (14.5%). The sensitivity, specificity, positive predictive value and negative predictive value for the ^{18}F-DCFPyL PET/CT detection of pelvic lymph-node metastases on a patient-level were 41.2% (Confidence interval (CI): 19.4-66.5%), 94.0% (CI: 86.9-97.5%), 53.8% (CI: 26.1-79.6%) and 90.4% (CI: 82.6-95.0%), respectively.

Conclusion: ^{18}F-DCFPyL PET/CT showed a high specificity (94.4%), yet a limited sensitivity (41.2%) for the detection of pelvic lymph-node metastases in primary PCa. This implies that current PSMA PET/CT imaging cannot replace diagnostic ePLND. Further research is necessary to define the exact place of PSMA PET/CT imaging in the primary staging of PCa.

Figure 1. 68-year-old man with cT2c, Gleason score 3 + 4 = 7 prostate cancer and initial PSA 10.4 ng/ml considered candidate for radical prostatectomy with extended pelvic lymph-node dissection. MSKCC nomogram showed 10.8% risk of lymph-node involvement. Transversal ^{18}F-DCFPyL PET (A) and fused PET/CT (B) show intense uptake in the pelvic region right, corresponding with an enlarged 10 mm lymph-node adjacent to the right external iliac artery on CT (C), suspect for lymph-node metastasis (*A-C*, left arrow). A contralateral focus with faint uptake is observed on PET and fused PET/CT in the pelvic region, without an evident morphologic substrate on CT. Due to the minimal tracer uptake (above the blood pool and lower than the liver), this left sided focus was not suspect for lymph-node metastasis after dual reading. After surgical resection of 26 lymph-nodes, post-operative histopathology revealed a right sided right iliac lymph-node metastasis measuring 10 mm, as well as a left iliac lymph-node metastasis of 5 mm, Hematoxylin and Eosin Stain, Original Magnification x 10 (D).