

Head-to-Head Comparison of ⁸⁹Zr-Df-IAB2M PET/CT to ¹¹¹In-Capromab Pendetide SPECT/CT Scans in the Detection of Occult Prostate Cancer in Patients Undergoing Radical Prostatectomy (RP) with Negative Conventional Imaging (CI) Studies

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Background

Accurate detection of nodal disease in High Risk Prostate Cancer (HRPC) is critical for proper patient management when undergoing radical prostatectomy (RP). However, conventional imaging (CI) with CT/MRI and bone scan fails to detect metastatic disease in up to 50% of HRPC patients. ¹¹¹In-Capromab Pendetide (CP; ProstaScint®), an approved imaging agent for detecting prostate cancer, offers some improvement over CI but still lacks adequate sensitivity and specificity. Thus improved tools are needed to enhance the detection of nodal disease of patients undergoing RP. IAB2M is a novel anti-PSMA minibody (Mb) based on the humanized J591 antibody that targets the extracellular domain of PSMA. ⁸⁹Zr labeled IAB2M is a promising PET agent for the detection of metastatic deposits¹. This study presents the results of the first nine patients (20 total planned) of an ongoing, open label, phase II, single center trial comparing the performance of ⁸⁹Zr-Df-IAB2M to ¹¹¹In-CP imaging in the detection of lymph node disease in HRPC with negative CI.

Objectives

- To compare the diagnostic performance of ⁸⁹Zr-Df-IAB2M PET/CT (IAB2M) with conventional imaging and ¹¹¹In-CP (CP) in the detection of extracapsular prostate cancer pre-prostatectomy as confirmed by tissue sampling

Materials and Methods

- The study protocol and informed consent were approved by a central IRB
- Planned enrollment of 20 with histologically confirmed PC scheduled to undergo RP with ≥ 15% associated risk of extracapsular disease by Briganti nomogram or Gleason score ≥9
- Negative extrapelvic disease by CI
- Enrolled subjects underwent sequential ¹¹¹In-CP SPECT/CT (5mCi ¹¹¹In, whole body scans obtained 3 days p.i.) and ⁸⁹Zr-Df-IAB2M (2.5mCi, whole body scans obtained 2 days p.i.) up to 28 days prior to planned RP with standard lymph node dissection

⁸⁹Zr-Df-IAB2M Imaging Parameters

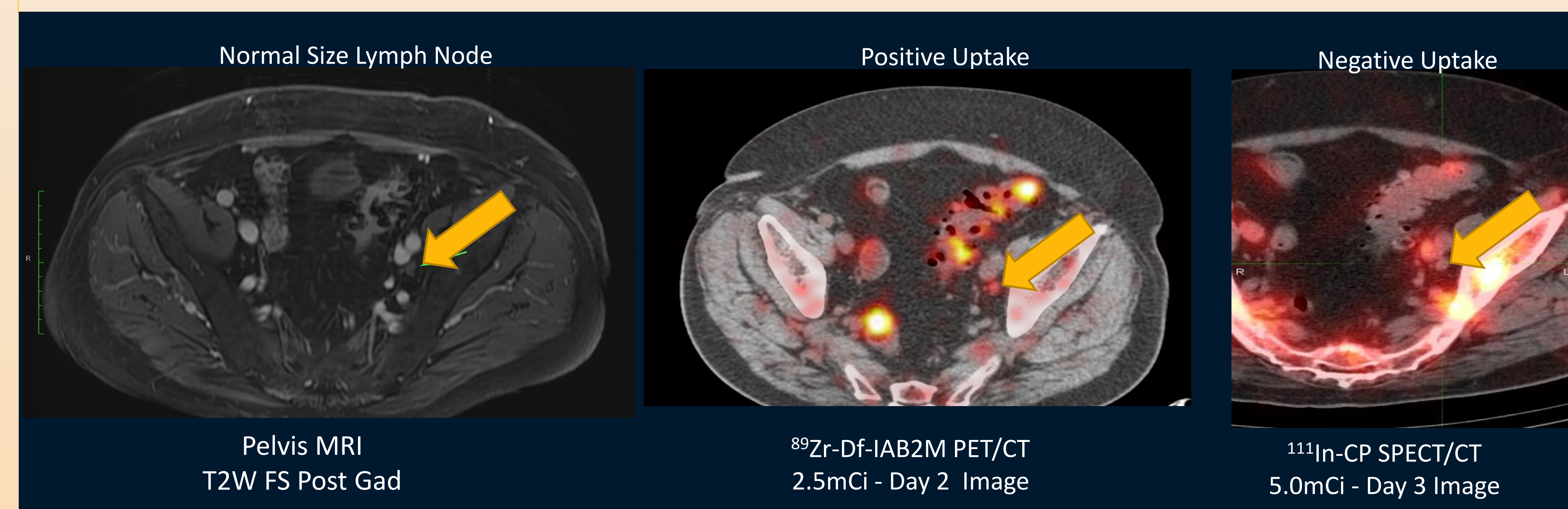
- ⁸⁹Zr-Df-IAB2M (manufactured and shipped from IBA, Somerset, NJ) was administered intravenously at 2.5mCi (±10%) co-infused with 10mg total protein dose unlabeled Mb
- Whole Body PET/CT were obtained at 48h (±24h) on GE Discovery LS, 2D mode, 3-5 min/bed position, set for ⁸⁹Zr positron (t_{1/2} = 78.4h, 897keV, branching fraction = 0.227), iterative reconstruction, 6mm Gaussian, CT 40mA

Results

Table 1: Demographics and Results

Characteristics	% (Number/Total) or Median (Range)
Number of Scanned Subjects (n)	9
Age (y.o.)	64.5 (50.7 - 75.1)
PSA (ng/ml)	12.5 (3.9 - 110.5)
Gleason Score	8 (7 - 9)
IAB2M Positive Scans (n)	88.9 (8/9)
CP Positive Scans (n)	11.1 (1/9)
CT Nodal Size (mm)	9.9 (7.6 - 10.9)
IAB2M SUV _{max}	6.2 (3.1 - 6.4)
Lymph Node Pos. Pathology Samples From 6 Subjects	22.9 (11/48)

Figure 1: Example of ⁸⁹Zr-Df-IAB2M Pos. and ¹¹¹In-CP Neg. Scans with Path Pos. Nodal Disease



Corresponding axial images from MRI, PET/CT and SPECT/CT showing increased uptake (yellow arrows) in left external iliac node on ⁸⁹Zr-Df-IAB2M PET/CT (9.4mm x 5.6mm; SUV_{max} = 5.6) but not ¹¹¹In-CP. The nodal basin had pathologically proven tumor.

Table 2: Scan Performance Compared to Surgical Nodal Basin Pathology

Scan Performance	⁸⁹ Zr-Df-IAB2M	¹¹¹ In-CP
Concordance to Pathology (%) (TP+TN/Total)	85.4 (41/48)	77.1 (37/48)
Discordance to Pathology (%) (FP+FN/Total)	14.6 (7/48)	22.9 (11/48)
PPV	75.0	0.0
NPV	87.5	77.1

Conclusions

- ⁸⁹Zr-Df-IAB2M PET/CT demonstrates superior performance to CI and ¹¹¹In-CP SPECT/CT in detecting occult lymph node disease in HRPC patients (Table 2)
- Greater than half of the pathology proven lymph node metastases had ⁸⁹Zr-Df-IAB2M PET/CT positive scans while no subjects with ¹¹¹In-CP SPECT or CI scans were positive for disease (Table 2)
- ⁸⁹Zr-Df-IAB2M PET detects disease in normal size nodes (Figure 1)
- ⁸⁹Zr-Df-IAB2M is a promising PET agent for detection of lymph node disease in high risk patients with negative or equivocal conventional imaging
- Enrollment is ongoing

References

¹Morris MJ, Solomon SB, Durack JC, et al. Pathologic correlation of ⁸⁹Zr-Df-IAB2M antiprostate-specific membrane antigen (PSMA) minibody in patients with metastatic prostate cancer. J Clin Oncol 33, 2015 (suppl 7; abstr 220)

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