**Supplemental table 1.** Performance of $^{68}$Ga-PSMA-11 PET according to literature

| Literature | Sensitivity | Specificity | PPV | NPV | ACC | N= |
|---|---|---|---|---|---|---|
| Hope et al 2018 | 74 | 96 | 93 | 85 | 86 | 266 |
| v. Eyben et al 2016 | 61 | 97 | | | | 273 |
| Corfield et al 2018 | 33–92 | 64–91 | 83–96 | 80–96 | | 216 |
| Perera et al 2016 | 86 | 86 | | | | 239 |
| Our Results | 72 | 93 | 74 | 93 | 93 | 58 |

**Supplemental table 2**

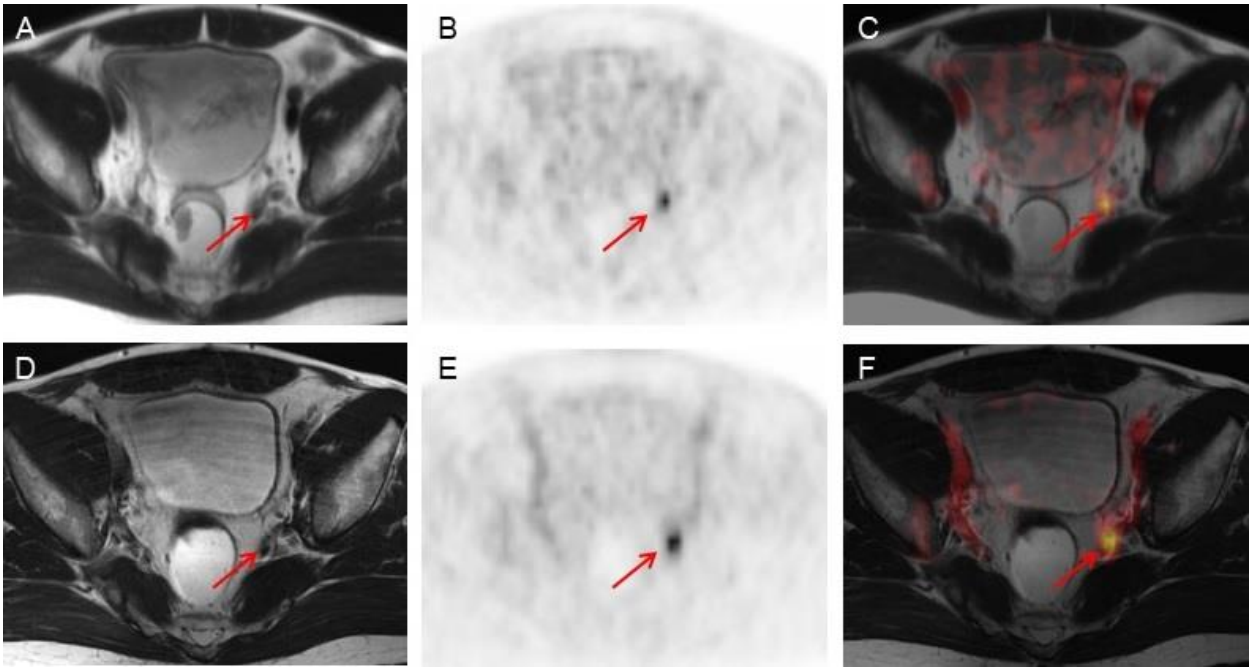
Diagnostic accuracy of $^{18}$F-rhPSMA-7 PET and cross-sectional imaging compared with histology (template-based analysis) modified by data retrieved from follow up.

| Morphological Grading | Histology: LN metastasis | | |
|---|---|---|---|
| | pos. | neg. | |
| 1† | 2 | 3 | PPV: 28.6% |
| 2† | 0 | 0 | |
| 3† | 4 | 12 | |
| 4 | 12 | 24 | NPV: 86.4% |
| 5 | 36 | 282 | |
| Total | 54 | 321 | 375 |
| | Sens.: 11.1% | Spec.: 95.3% | Acc.: 83.2% |

| $^{18}$F-rhPSMA7-PET Grading | Histology: LN metastasis | | |
|---|---|---|---|
| | pos. | neg. | |
| 1* | 26 | 3 | PPV: 78.9% |
| 2* | 4 | 5 | |
| 3 | 1 | 10 | NPV: 92.9% |
| 4 | 2 | 17 | |
| 5 | 21 | 286 | |
| Total | 54 | 321 | 375 |
| | Sens.: 55.6% | Spec.: 97.5% | Acc.: 91.4% |

(pos.: positive; neg.: negative; Sens.: sensitivity; Spec.: specificity; PPV: positive predictive value; NPV: negative predictive value; Acc.: accuracy; LN: lymph nodes; †: values for Morphological grading: 1–3 positive (4–5 negative**), *: values for 18F-rhPSMA-7 PET Grading: 1+2 positive (3–5: negative) for LN metastasis**)

** based on highest Youden index




**Supplemental Fig. 1:** Pre- (lower row) and 7 months postoperative (upper row) $^{18}$F-rhPSMA-7 PET/MR datasets from a 61-year-old patient (Gleason Score 9, iPSA 25.98 ng/mL). Preoperative staging shows an $^{18}$F-rhPSMA-7-positive lymph node in the left pelvic. After surgery PSA persistence at a PSA value of 0.21 ng/ml was noted. $^{18}$F-rhPSMA-7 PET/MR imaging revealed the lymph node metastasis still in place which was subsequently successfully removed using PSMA-targeted radio-guided surgery.