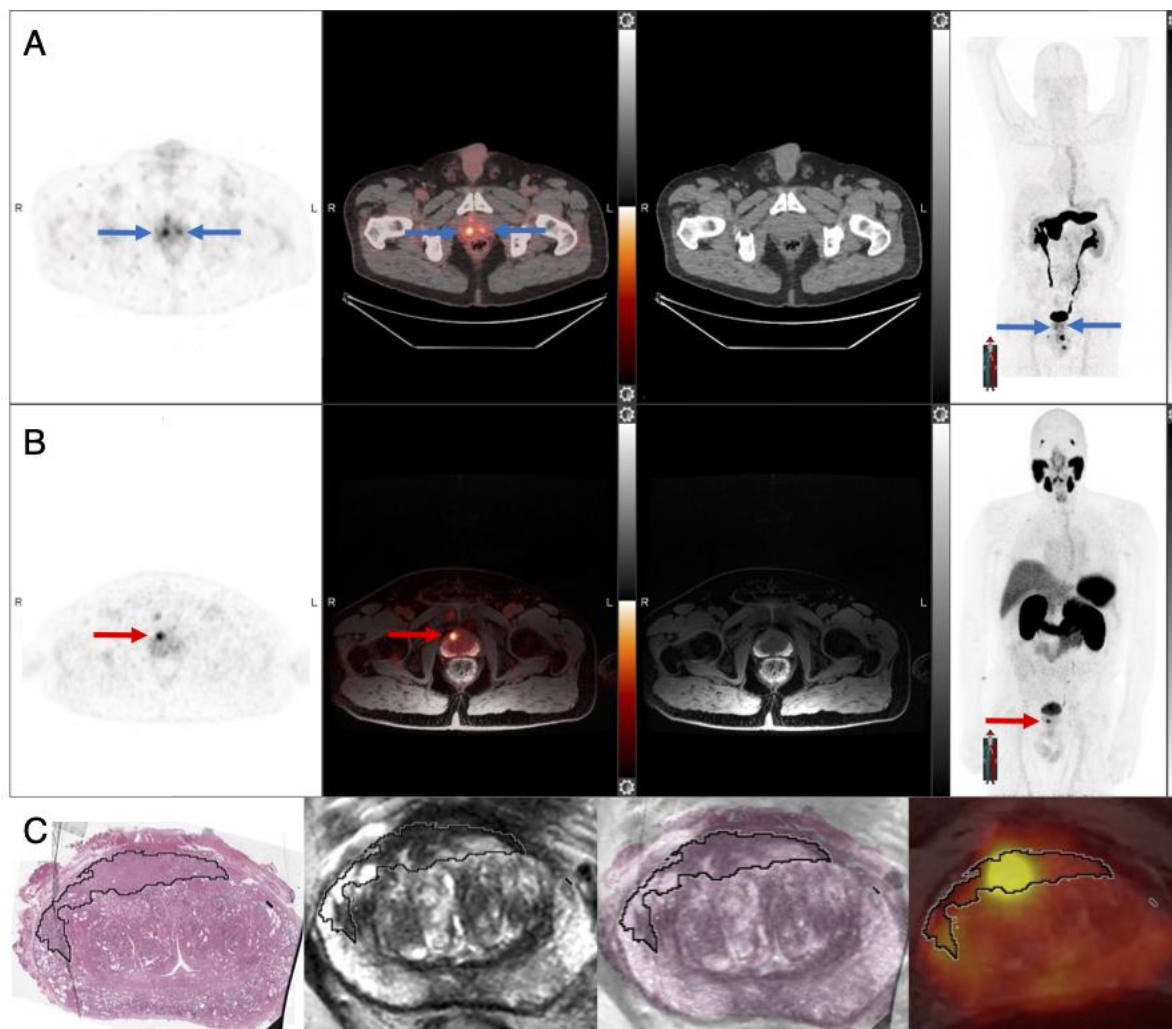


Supplemental Figure 1: 54-year-old patient with intermediate-risk prostate cancer and PSA 5.09 ng/mL. ^{68}Ga -RM2 PET/CT (A, axial PET, fused PET/CT, CT, and MIP) shows true positive focal uptake right mid-apex (red arrows) while ^{68}Ga -PSMA11 PET/MRI (B) is false negative, and shows false positive uptake mid-apex left of the prostate (blue arrows). Final histopathology demonstrated Gleason score 4+4 prostate adenocarcinoma right mid-apex.



Supplemental Figure 2 64-year-old patient with high-risk prostate cancer and PSA 8.8 ng/mL. ^{68}Ga -RM2 PET/CT (A, axial PET, fused PET/CT, CT, and MIP) shows focal uptake bilateral in the prostate (blue arrows) while ^{68}Ga -PSMA PET/MRI (B) demonstrates uptake right anterior (red arrows). Histology, overlaid with pre-operative axial T2WI and ^{68}Ga -PSMA11 fused PET/MRI (C) showed actual disease expansion crossing the midline to the left side (black outline) correlating to a Gleason score 3+4 prostate adenocarcinoma.

Supplemental Table 1: Sensitivity, specificity, and accuracy (95% confidence interval) of all modalities for prostate cancer localization.

Modality	Sensitivity	Specificity	Accuracy
⁶⁸Ga-RM2	97.9% (88.7, 99.9)	64.7% (38.3, 85.8)	89.1% (78.8, 95.5)
⁶⁸Ga-PSMA11	95.0% (75.1, 99.9)	66.7% (22.3, 95.7)	88.5% (69.8, 97.6)
mpMRI	77.3% (62.2, 88.5)	75.0% (47.6, 92.7)	76.7% (64.0, 86.6)

Supplemental Table 2: Sensitivity, specificity, and accuracy (95% confidence interval) of all modalities for prostate cancer and lymph node metastases localization.

Modality	Sensitivity	Specificity	Accuracy
⁶⁸Ga-RM2	87.1% (76.1, 94.3)	90.8% (81, 96.5)	89% (82.2, 93.8)
⁶⁸Ga-PSMA11	76.7% (57.7, 90.1)	95.5% (77.2, 99.9)	84.6% (71.9, 93.1)
mpMRI	57.6% (44.1, 70.4)	92.9% (82.7, 98.0)	74.8% (65.8, 82.4)

Supplemental Table 3: Sensitivity, specificity, and accuracy (95% confidence interval) for prostate cancer lesions of ⁶⁸Ga-RM2 and ⁶⁸Ga-PSMA11 PET, stratified to participants with intermediate- and high-risk PC.

⁶⁸Ga-RM2	Sensitivity	Specificity	Accuracy
Intermediate-risk	95.5% (77.2, 99.9)	62.5% (24.5, 91.5)	86.7% (69.3, 96.2)
High-risk	100.0% (86.3, 100.0)	66.7% (29.9, 92.5)	91.2% (76.3, 98.1)
⁶⁸Ga-PSMA11			
Intermediate-risk	100.0% (71.5, 100.0)	100.0% (29.2, 100.0)	100.0% (76.8, 100.0)
High-risk	88.9% (51.8, 99.7)	100.0% (29.2, 100.0)	91.7% (61.5, 99.8)