[^{64}Cu]Cu-SAR-Bombesin ([^{64}Cu]Cu-SAR-BBN) PET-CT for the detection of biochemically recurrent PSMA-PET negative prostate cancer: a case series

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BACKGROUND

The evolution of receptor-targeted PET and research into PSMA-PET has significantly increased the detection of Prostate Cancer (Pca) and improved patient selection for treatment.

30-50% of men undergoing radical prostatectomy (RP) for PCa will fail treatment with a rising PSA (biochemical recurrence/BCR). Within this cohort, a proportion of men with BCR (PSA ≤1 ng/mL) are potentially curable with stereotactic radiotherapy.

As a proliferative agent, PSMA has improved detection of aggressive disease but less so in detecting indolent disease. Factors including PSMA expression, low volume disease and imaging limitations influence disease detection on PSMA-PET. It is imperative to have timely detection of potentially treatable sites of BCR in men with PSMA-negative PCa.

Gastrin releasing peptide receptor (GRPR) is over-expressed in less aggressive PCa and may be an alternative target for receptor-targeted PET with theranostic potential. Bombesin (BBN) is a 14-amino-acid amphibian homolog of the mammalian gastrin-releasing peptide, that has high binding affinity to the gastrin-releasing peptide receptor (GRPR).

A special access scheme through CLARITY Pharmaceuticals has provided access to [^{64}Cu]Cu-SAR-BBN. This case series demonstrates the utility of [^{64}Cu]Cu-SAR-BBN in detecting PSMA-negative disease in BCR.

METHODS

Four men post-RP demonstrated BCR with serial negative PSMA-PET (^{68}Ga-PSMA-11). Traditionally used imaging modalities including Bone Scan, CT and in some cases, whole body MRI failed to identify sites of recurrence.

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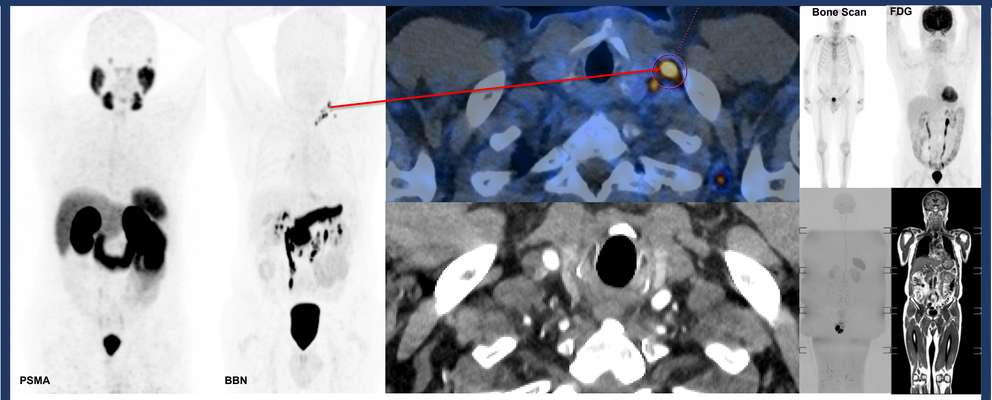
All patients received 220 MBq of [^{64}Cu]Cu-SAR-BBN intravenously with 60 minutes for uptake. Patient were scanned at 180 minutes post-injection with arms up, from vertex to mid thighs and at each bed position for two minutes. A low dose CT scan was performed with for attenuation correction and anatomical localisation.

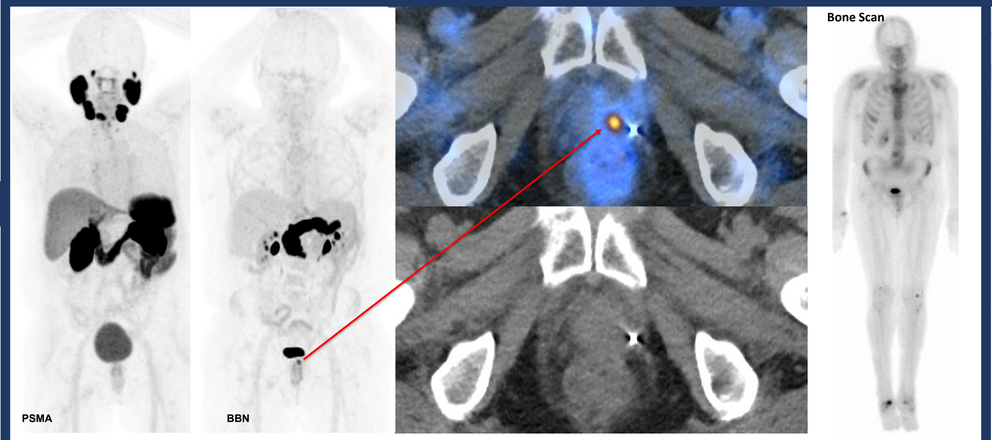
Follow-up and monitoring for adverse events was undertaken.

CASE 1



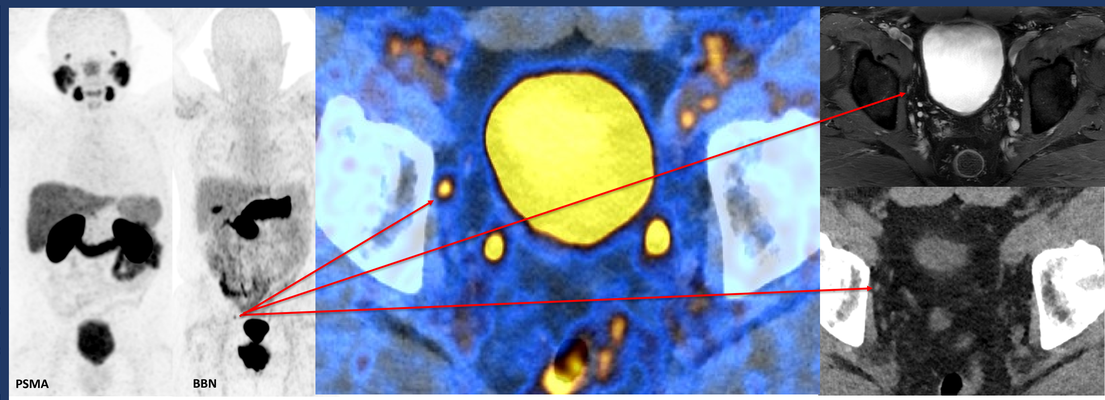
74M, PCa, Previous RP 2012, Pelvic Radiotherapy 2018. BCR with PSA Doubling in 8 months 2→6→30
Negative Bone Scan, FDG, serial PSMA-PET and Whole Body MRI. Positive [^{64}Cu]Cu-SAR-Bombesin: left cervical chain. Ultrasound guided biopsy=metastatic PCa

CASE 2



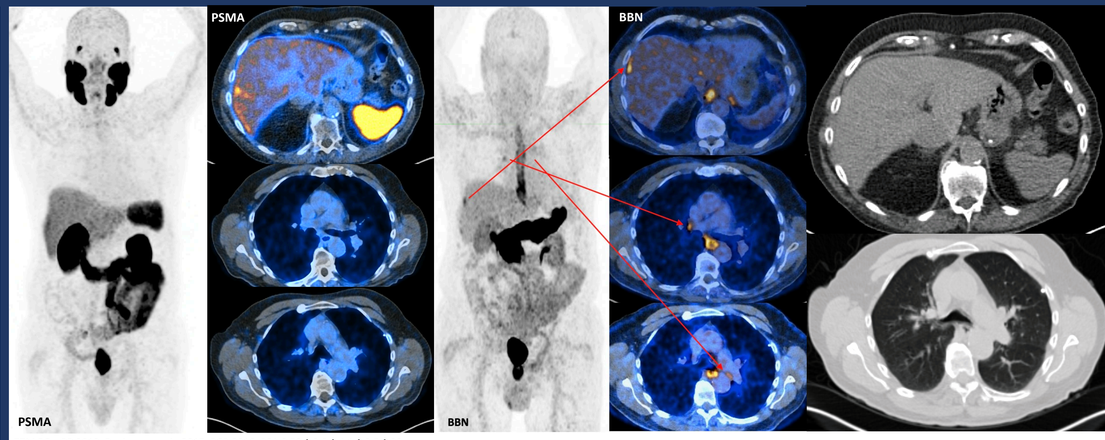
72M, PCa→External beam radiotherapy 13 years ago. BCR with Rising PSA 0.01→0.09→0.16
Negative CT, FDG, PSMA-PET. [^{64}Cu]Cu-SAR-Bombesin positive for local recurrence. Biopsy negative but only identifiable focus

CASE 3



63M RP, Radiotherapy 2019, BCR with PSA Rising 0.11→0.47→0.99
FDG and Serial PSMA-PET Negative. MRI and [^{64}Cu]Cu-SAR-Bombesin positive–obturator node. No biopsy undertaken but true recurrence as PSA drop post salvage radiotherapy in the absence of systemic treatment

CASE 4



77M PCa, RP 2013. Radiotherapy in 2015, BCR 2016. PSA 0.59→2.8→4.1→9.5→20
FDG and serial PSMA-PET negative
[^{64}Cu]Cu-SAR-Bombesin positive: Bilateral lung hilar and liver avidity.

CONCLUSION

[^{64}Cu]Cu-SAR-BBN has demonstrated diagnostic imaging potential in PSMA-negative PCa. Additionally, this case series highlights the theranostic potential of BBN. Further work in larger cohorts will be required to assess the suitability of GRPR targeting in molecular imaging and thernostics.

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