

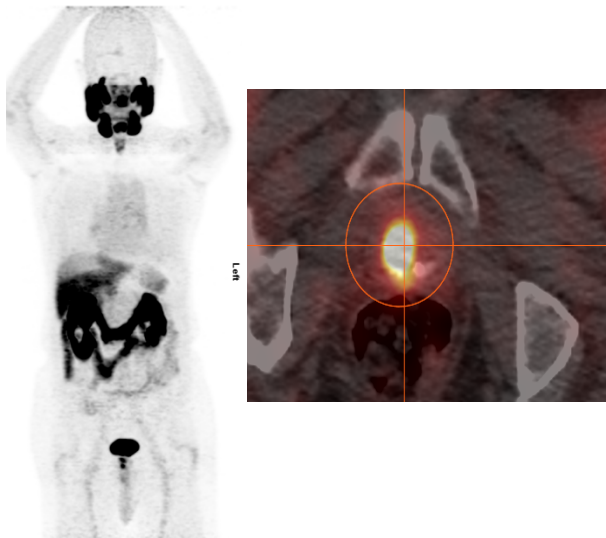
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^{68}Ga -PSMA in Prostate Cancer

C Sit, C Zhou, F Marafi, S Navalkisoor, G Gnanasegaran

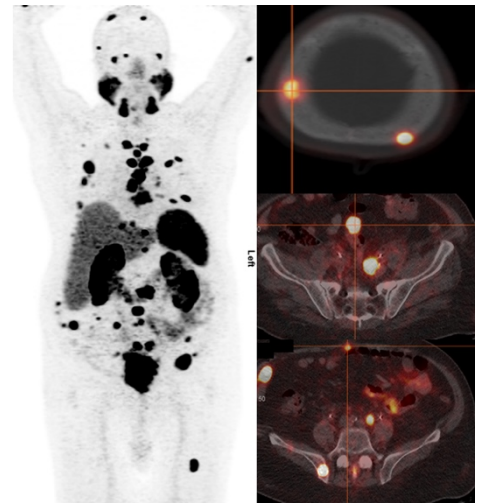
CLINICAL DETAILS

CASE 1: Recurrent Prostate Cancer:
Patient had rising PSA post-external beam radiation therapy. He was referred for a ^{68}Ga -PSMA to assess any recurrent disease



^{68}Ga -PSMA scan shows focal increased tracer uptake within the prostate gland. Physiological uptake is noted in the kidney, proximal small intestine or salivary glands.

CASE 2: Recurrent Prostate Cancer:
Patient had rising PSA post-external beam radiation therapy. He was referred for a ^{68}Ga -PSMA to assess any recurrent disease



^{68}Ga -PSMA scan show multiple foci increased tracer uptake within the skeletal (skull, ribs, spine, pelvis, left femur) and extra skeletal (lymph nodes in abdomen and pelvis)

DISCUSSION

⁶⁸Ga-PSMA in Recurrent Prostate cancer

Prostate cancer is the most common tumour in men worldwide. Detection and management of early tumour recurrence after prostatectomy / radiotherapy / other local treatment modalities is challenging. In general, recurrence after initial treatment is often diagnosed by:

- a) Two consecutive prostate-specific antigen (PSA) values of ≥ 0.2 $\mu\text{g/l}$ post-prostatectomy or
- b) external beam radiation therapy.

PET-CT imaging with choline is often used to access patients with suspected recurrence. However, the results are not encouraging due to relatively low sensitivity and specificity in patients with early recurrence. Radiolabelled prostate-specific membrane antigen (PSMA) imaging is used in imaging early recurrence. PSMA is expressed in prostate cancer cells, kidney, proximal small intestine or salivary glands [1-6]. However, it is significantly over expressed in prostate cancer cells [5,6].

PSMA is reported to be a promising agent in imaging early detection of tumour recurrence after prostatectomy, radiotherapy or other local treatment. In general, PSMA is labelled with ⁶⁸Ga or ^{99m}Tc for imaging and ¹⁷⁷Lu for targeted radionuclide therapy for skeletal and extra-skeletal metastatic disease.

REFERENCES

1. Afshar-Oromieh A, Avtzi E, Giesel FL et al. The diagnostic value of PET/CT imaging with the ⁶⁸Ga-labelled PSMA ligand HBED-CC in the diagnosis of recurrent prostate cancer. *Eur J Nucl Med Mol Imaging* (2015) 42:197–209.
2. Schäfer M, Bauder-Wüst U, Leotta K, Zoller F, Mier W, Haberkorn U, et al. A dimerized urea-based inhibitor of the prostate-specific membrane antigen for ⁶⁸Ga-PET imaging of prostate cancer. *EJNMMI Res* 2012;2:23.
3. Bander NH. Technology insight: monoclonal antibody imaging of prostate cancer. *Nat Clin Pract Urol* 2006;3:216–25.
4. Liu H, Moy P, Kim S, Xia Y, Rajasekaran A, Navarro V, et al. Monoclonal antibodies to the extracellular domain of prostate-specific membrane antigen also react with tumor vascular endothelium. *Cancer Res* 1997;57:3629–34.
5. Sweat SD, Pacelli A, Murphy GP, Bostwick DG. Prostate-specific membrane antigen expression is greatest in prostate adenocarcinoma and lymph node metastases. *Urology* 1998;52:637–40.
6. Mannweiler S, Amersdorfer P, Trajanoski S, Terrett JA, King D, Mehes G. Heterogeneity of prostate-specific membrane antigen (PSMA) expression in prostate carcinoma with distant metastasis. *Pathol Oncol Res* 2009;15:167–72.
7. Maurer T, Eiber M, Schwaiger M, Gschwend J.E. Current use of PSMA-PET in prostate cancer management. *Nat Rev Uro* (2016) 13:226-235.

KEY POINTS

- Imaging of prostate cancer and its recurrence is challenging.
- PSMA labelled with ⁶⁸Ga is a promising agent which has been reported to improve detection of metastatic disease, even at low serum PSA values compared to conventional imaging [7].