

- 5 Takahara T, Imai Y, Yamashita T *et al.* Diffusion weighted whole body imaging with background body signal suppression (DWIBS): technical improvement using free breathing, STIR and high resolution 3D display. *Radiat. Med.* 2004; **22**: 275–82.
- 6 Padhani AR, Lecouvet FE, Tunariu N *et al.* Rationale for modernising imaging in advanced prostate cancer. *Eur. Urol. Focus.* 2017; **3**: 223–39.
- 7 Lecouvet FE, Talbot JN, Messiou C *et al.* Monitoring the response of bone metastases to treatment with magnetic resonance imaging and nuclear medicine techniques: a review and position statement by the European Organisation for Research and Treatment of Cancer imaging group. *Eur. J. Cancer* 2014; **50**: 2519–31.
- 8 Soloway MS, Hardeman SW, Hickey D *et al.* Stratification of patients with metastatic prostate cancer based on extent of disease on initial bone scan. *Cancer* 1988; **61**: 195–202.
- 9 Wang HT, Yao YH, Li BG *et al.* Neuroendocrine Prostate Cancer (NEPC) progressing from conventional prostatic adenocarcinoma: factors associated with time to development of NEPC and survival from NEPC diagnosis—a systematic review and pooled analysis. *J. Clin. Oncol.* 2014; **32**: 3383–90.
- 10 Fléchon A, Pouessel D, Ferlay C *et al.* Phase II study of carboplatin and etoposide in patients with anaplastic progressive metastatic castration-resistant prostate cancer (mCRPC) with or without neuroendocrine differentiation: results of the French Genito-Urinary Tumor Group (GETUG) P01 trial. *Ann. Oncol.* 2011; **22**: 2476–81.
- 11 Klenk C, Gawande R, Uslu L *et al.* Ionising radiation-free whole-body MRI versus (18F)-fluorodeoxyglucose PET/CT scans for children and young adults with cancer: a prospective, non-randomised, single-centre study. *Lancet Oncol.* 2014; **15**: 275–85.
- 12 Wilhelm T, Stieltjes B, Schlemmer HP. Whole-body-MR-diffusion weighted imaging in oncology. *Rofo* 2013; **184**: 950–8.
- 13 Xu GZ, Li CY, Zhao L *et al.* Comparison of FDG whole-body PET/CT and gadolinium-enhanced whole-body MRI for distant malignancies in patients with malignant tumors: a meta-analysis. *Ann. Oncol.* 2013; **24**: 96–101.
- 14 Blackledge MD, Collins DJ, Tunariu N *et al.* Assessment of treatment response by total tumor volume and global apparent diffusion coefficient using diffusion-weighted MRI in patients with metastatic bone disease: a feasibility study. *PLoS One* 2014; **9**: e91779.
- 15 Spratt DE, Gavane S, Tarlinton L *et al.* Utility of FDG-PET in clinical neuroendocrine prostate cancer. *Prostate* 2014; **74**: 1153–9.
- 16 Sterzing F, Kratochwil C, Fiedler H *et al.* (68)Ga-PSMA-11 PET/CT: a new technique with high potential for the radiotherapeutic management of prostate cancer patients. *Eur. J. Nucl. Med. Mol. Imaging* 2016; **43**: 34–41.
- 17 Parida GK, Tripathy S, Datta Gupta S *et al.* Adenocarcinoma prostate with neuroendocrine differentiation: potential utility of 18F-FDG PET/CT and 68Ga-DOTANOC PET/CT over 68Ga-PSMA PET/CT. *Clin. Nucl. Med.* 2018; **43**: 248–9.

Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:


Figure S1. CT scan finding of bone metastases at diagnosis and at detection of t-NEPC.

Editorial Comment

Editorial Comment to Utility of whole-body diffusion-weighted magnetic resonance imaging in the management of treatment-related neuroendocrine prostate cancer

Neuroendocrine prostate cancer (NEPC) is a rare and aggressive malignancy that requires careful monitoring, as it often leads to visceral and osteolytic metastases as well as low prostate-specific antigen (PSA) production. Studies concerning castration-resistant prostate cancer (CRPC) patients have reported radiographic progression in 24.5% of cases without clinical or PSA progression when androgen receptor-axis-targeted therapies were used, and the utility of follow-up imaging extends beyond NEPC alone.¹ In this report, Kurashina *et al.* reported a case with treatment-related NEPC (t-NEPC) in which a whole-body magnetic resonance imaging (WB-MRI) was useful in monitoring disease progression and treatment response in t-NEPC with radiographic progression in the absence of PSA progression.² The patient's osteoblastic metastases responded well to primary anti-androgen therapy, showing an osteosclerotic response. As distinguishing between osteosclerotic progression and responses in bone metastases is challenging, monitoring bone sclerotic lesions are similarly difficult with bone scintigraphy or computed

tomography (CT). WB-MRI is a next-generation imaging modality for prostate cancer, as is positron emission tomography-CT/MRI with prostate-specific membrane antigen.³ Diffusion-weighted imaging (DWI) is ideal for diagnosing active bone metastases, as both osteoblastic and osteolytic metastases can be visualized as clear, high-signal images. Moreover, WB-MRI is a one-step staging tool, assessing primary prostate cancer as well as lymph node, visceral, and bone metastases simultaneously.⁴ Monitoring as part of the evaluation of treatment response may enable early changes in systemic treatment methods that previously produced no response, as in the present case. DWI signals reflect treatment-induced changes in the microstructure of cells and can serve as an imaging biomarker when assessing therapeutic response.⁵ Therefore, WB-MRI holds promise for screening and monitoring systematic metastases in t-NEPC patients. WB-MRI may be useful for customizing therapeutic approaches to CRPC as well as t-NEPC.

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Conflict of interest

The authors declare no conflict of interest.

References

- 1 Bryce AH, Alumkal JJ, Armstrong AH *et al.* Radiographic progression with nonrising PSA in metastatic castration-resistant prostate cancer: post hoc analysis of PREVAIL. *Prostate Cancer Prostatic Dis.* 2017; **20**: 221–7.
- 2 Kurashina R, Kijima T, Okazaki A *et al.* Utility of whole-body diffusion-weighted magnetic resonance imaging in the management of treatment-related neuroendocrine prostate cancer. *IJU Case Rep.* 2021; **4**: 69–73.
- 3 Gillessen S, Attard G, Beer TM *et al.* Management of patients with advanced prostate cancer: report of the advanced prostate cancer consensus conference 2019. *Eur. Urol.* 2020; **77**: 508–47.
- 4 Lecouvet FE, El Mouedden J, Collette L *et al.* Can whole-body magnetic resonance imaging with diffusion-weighted imaging replace Tc 99m bone scanning and computed tomography for single-step detection of metastases in patients with high-risk prostate cancer? *Eur. Urol.* 2012; **62**: 68–75.
- 5 Padhani AR, Liu G, Koh DM *et al.* Diffusion-weighted magnetic resonance imaging as a cancer biomarker: consensus and recommendations. *Neoplasia* 2009; **11**: 102–25.