

The Phoenix criteria for biochemically recurrent prostate cancer after curative radiotherapy appear obsolete in the era of prostate-specific membrane antigen PET: A plea for urgent re-evaluation of current guidelines

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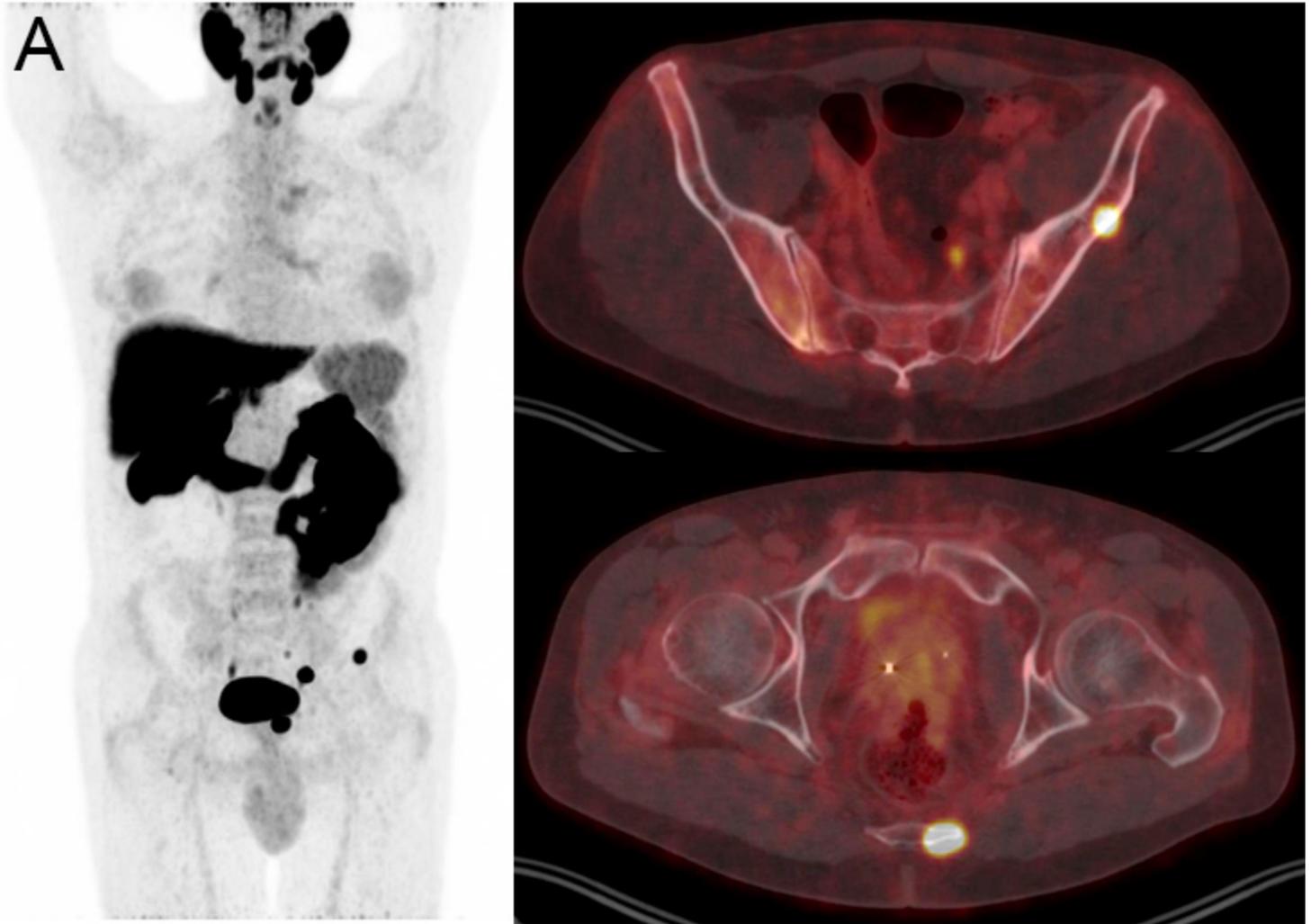
Introduction & Objectives: Biochemical recurrence (BCR) of prostate cancer (PCa) after curative radiotherapy is defined as a prostate-specific antigen (PSA) rise of 2 ng/mL above the nadir (the 'Phoenix criteria', 2005). When these criteria were drawn up, detection of PCa metastases was based on conventional imaging (e.g. CT, bone scan) and detection of local recurrences was based on prostate biopsies, all of which offer poor diagnostic accuracy for BCR. With the introduction of Prostate-Specific Membrane Antigen Positron-Emission Tomography (PSMA PET), the ability to localize PCa recurrences has markedly increased. Here, we evaluate PSMA PET in patients with a rising PSA following radiotherapy who did not meet the Phoenix criteria yet (i.e. a PSA <2 ng/mL above the nadir).

Materials & Methods: We reviewed 315 patients scanned between 2015 and 2018 with PSMA PET (using either ⁶⁸Ga-PSMA-HBED-CC or ¹⁸F-DCFPyL) after curative radiotherapy in the Prostate Cancer Network Amsterdam. All scans were reviewed by experienced (>200 PSMA PET scans) nuclear medicine physicians.

Results: Sixty-three patients (20.3%) were scanned before the Phoenix criteria were met (median PSA rise 1.2 ng/mL). In 53 of these patients (84.1%) PSMA PET-avid lesions were detected nonetheless: 21 patients (33.3%) revealed local recurrences as the single site of disease, 32 patients (50.8%) harboured metastatic PCa (14 patients had regional lymph node metastases only; 18 patients distant metastases). Other than a rising PSA, no predictors were identified that prompted early PSMA-PET imaging.

Figure 1 Exemplary ¹⁸F-DCFPyL PET/CT images of a patient treated with external-beam radiotherapy, with a current PSA value of 1.3 ng/mL (nadir PSA 0.3 ng/mL). Three regional lymph node metastases and three bone metastases were detected. Left: Maximum Intensity Projection;

Right: PET/CT fusion images.



Conclusions: Recurrent, metastatic PCa is frequently detected with PSMA PET in men not meeting the Phoenix criteria. These unexpected findings are a plea for urgent re-evaluation of current criteria for BCR after radiotherapy, as earlier detection of recurrences might refine salvage and/or adjuvant therapies, potentially improving patient outcome.