

# Case Report:

## MRI-guided Prostate Biopsy in a Patient with Prior Negative TRUS-Guided Biopsies and Persistently Elevated PSA-Levels

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**1** Coronal reformation of the initially performed <sup>11</sup>C-Choline PET-CT.

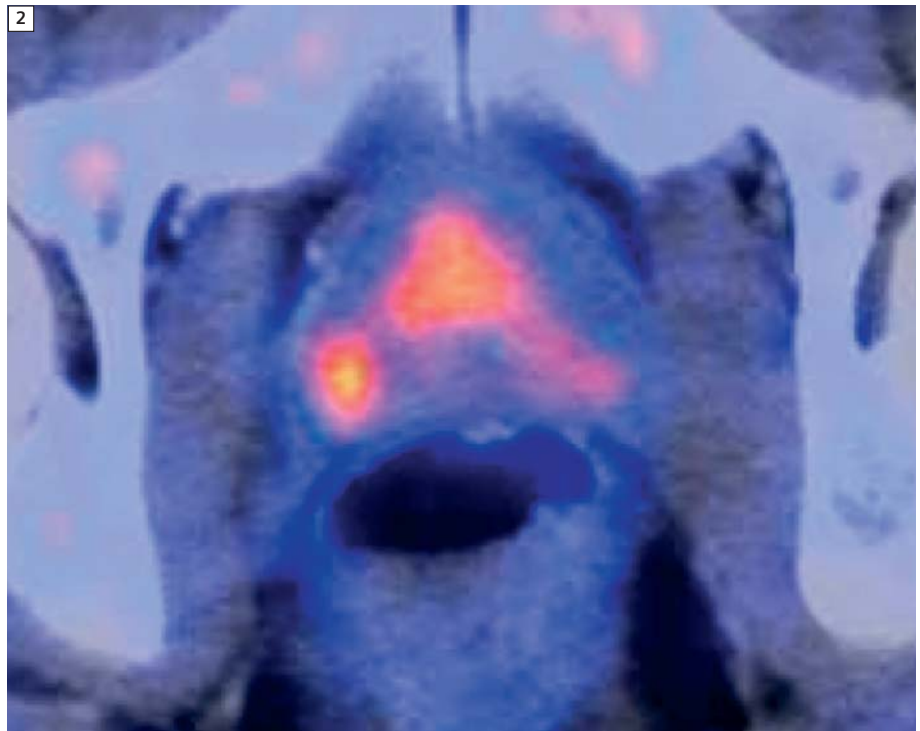
With the widespread introduction of prostate-specific antigen (PSA) testing, the characteristics of prostate cancer (PCa) patients have changed dramatically in the last fifteen years in favor of individuals with organ-confined disease. Histological confirmation of PCa remains essential for initiating therapy but, unfortunately, repeated negative prostate biopsies are not uncommon. Only 25–40% of all men with a PSA-level between 4 and 10 ng/ml are reported to have PCa, and therefore cancer detection rates by conventional prostate biopsy are low in this patient cohort [1]. Additional rounds of TRUS-biopsies in case of former negative prostate biopsies do not seem to improve cancer detection rates in patients with persistently elevated PSA-levels significantly. In fact, on first, second, third and fourth round, detection rates of a PCa have been reported to be only 14–22%, 10–15%, 5–10%, and 4%, respectively [2, 3]. Endorectal magnetic resonance imaging (endoMRI) is the most sensitive imaging method for detection and localization of PCa. In contrast to guided transrectal ultrasound (TRUS) prostate biopsy, MRI-guided biopsy offers the possibility to integrate metabolic and functional information and to perform prostate biopsy with direct control of the probe placement [4]. MRI-guided biopsy can be used to

increase cancer detection rate after a negative TRUS-biopsy [5–7].

### Case report

A 65-year-old man was referred to our institution for combined whole-body (wb) [<sup>11</sup>C]-Choline positron-emission-tomography for tumor screening after two negative sessions of TRUS prostate biopsies and persistently elevated PSA-levels over a period of 27 months (PSA at the time of presentation was 6.37 ng/ml, the estimated prostate volume was 45 cm<sup>3</sup>). PET-CT revealed focal pathologic tracer uptake in the right dorsal peripheral gland. An endoMRI for planning an eventual MRI-guided biopsy of the prostate was recommended and performed 20 days after the PET-CT. EndoMRI at 1.5 Tesla (MAGNETOM Sonata, Siemens Healthcare, Erlangen, Germany) showed a corresponding suspicious area in the right very lateral peripheral gland with a maximal diameter of 1.1 cm. MR spectroscopic imaging (3D MRSI) was additionally performed, but no suspicious elevation of the (Cho+Cr)/Ci ratio was found in the suspicious area. The time-interval between endoMRI and MRI-guided prostate biopsy was 13 days. MRI-guided biopsy was performed at 1.5 Tesla MR scanner without use of an endorectal coil (MAGNETOM Avanto, Siemens Healthcare, Erlangen, Germany).

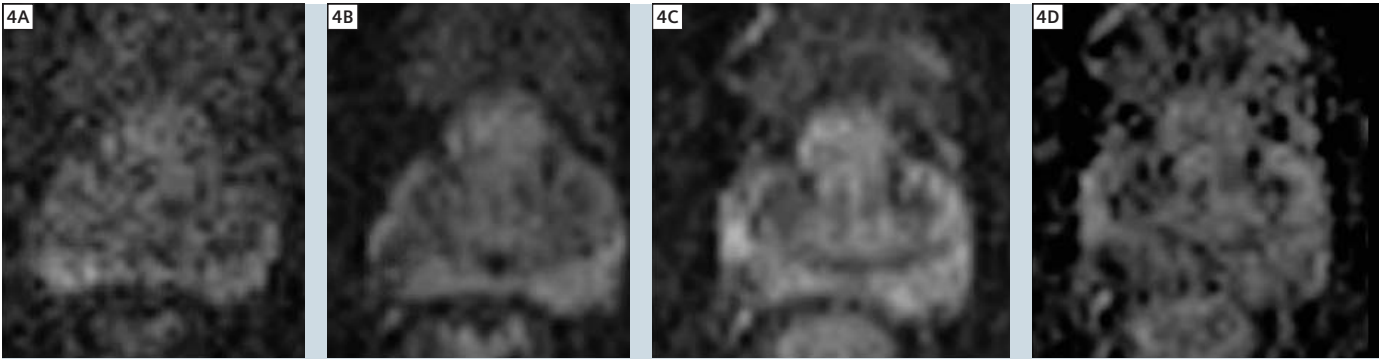
T2w imaging was used for guidance of the 18-gauge fully automatic biopsy gun (TSK Laboratory, Japan/MRI Devices Daum GmbH, Schwerin, Germany). For fixation and adjustment of the needle, a biopsy devise described by Beyersdorff, et al. [1] was used (Invivo Daum GmbH, Schwerin, Germany). Diffusion-weighted imaging (*syngo REVEAL*) with high b-values at the time point of the biopsy showed a restriction of water mobility in the suspicious area. MRI-guided biopsies of the medial parts of the suspicious lesion could be performed. A total of 3 specimens from this area and additionally one specimen for coverage of the contralateral peripheral gland were taken during the MR intervention. Histological examination of routinely processed formalin-fixed and paraffin-embedded biopsy specimen revealed the infiltrates of a moderately differentiated tubular adenocarcinoma (Gleason score  $2 + 3 = 5$ ) in all 3 guided biopsy specimens. Figure 6 shows one of the three biopsy specimens with infiltration of moderately differentiated tubular adenocarcinoma; anti-cytokeratin 5/6 immunostaining highlighting some non-neoplastic glands with ck 5/6-positive basal cells; non-neoplastic and neoplastic glands are shown, the latter with enlarged nuclei and prominent nucleoli; low proliferative activity with Ki-67 (clone Mib1).



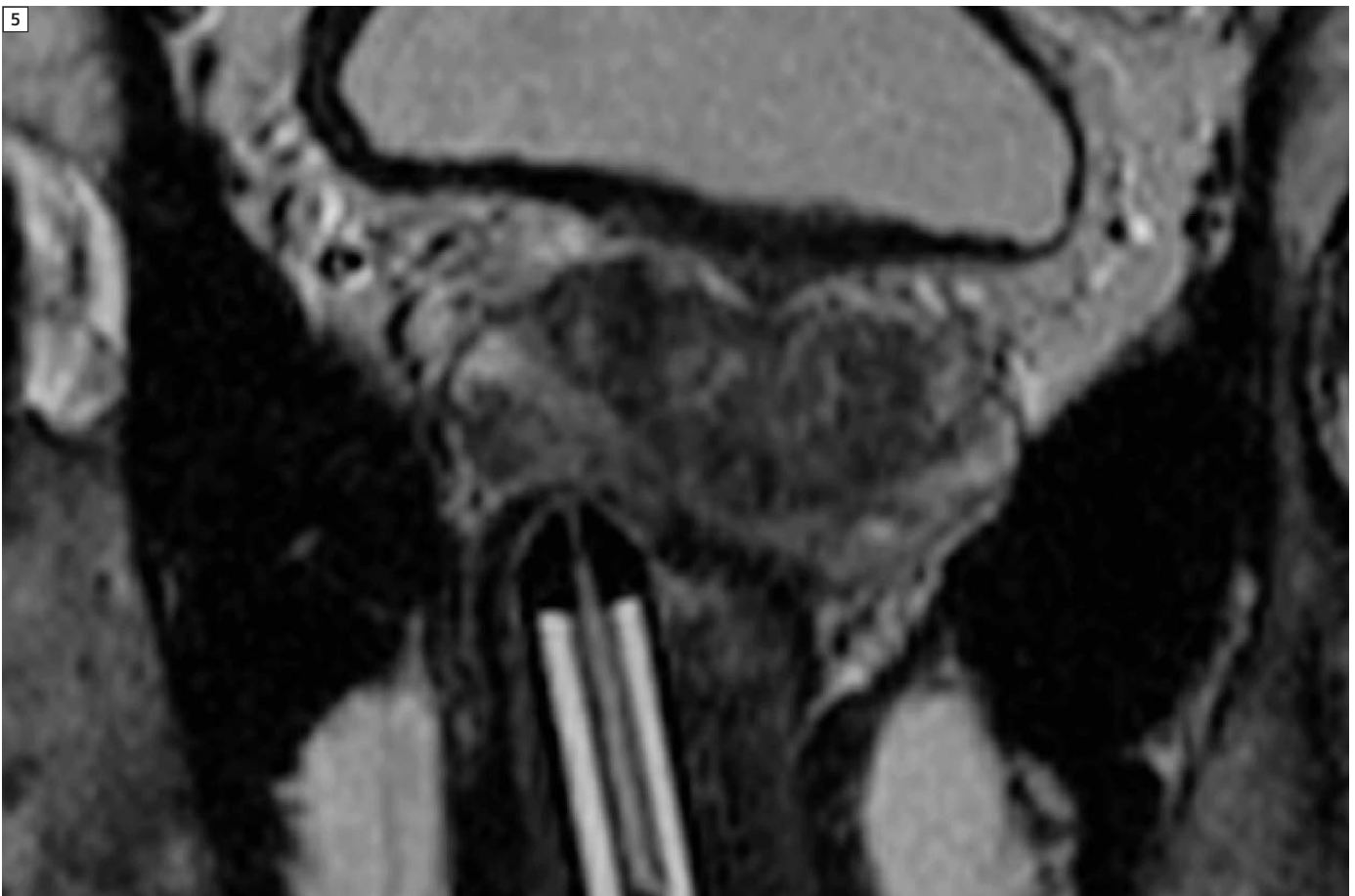
**2** Fused PET/CT, revealing a focal and therefore suspicious area within the right, very lateral peripheral gland.



**3** High-resolution T2w TSE, acquired at 1.5T with an endorectal coil, demonstrates a small circumscribed lesion with correlation to the PET finding.

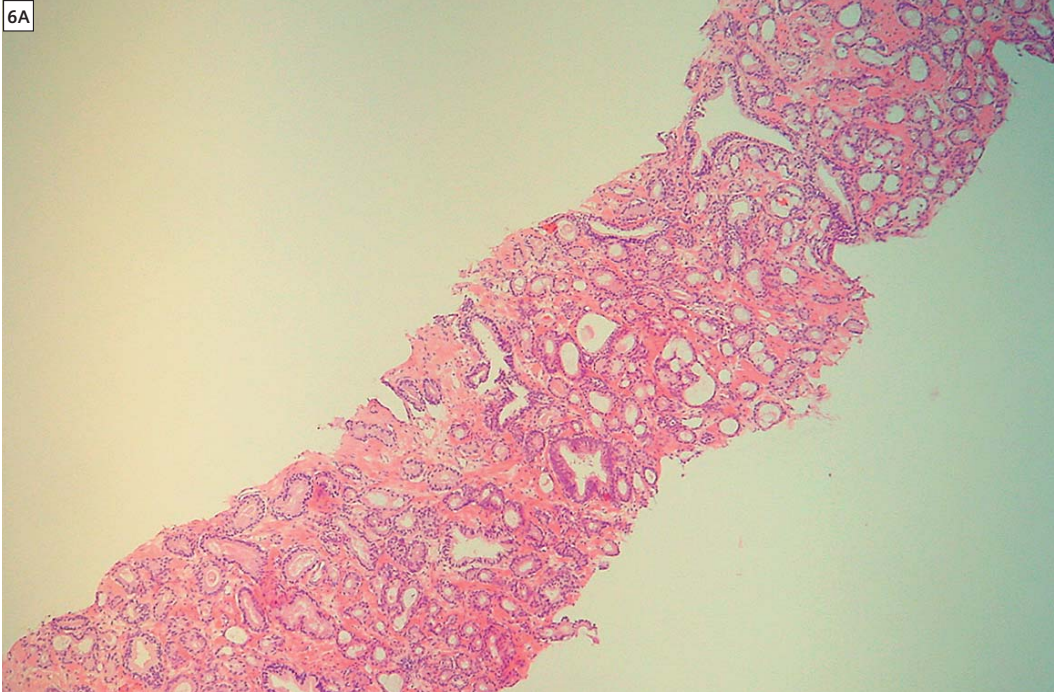


**4** DWI measured with a 3-scan trace technique showing a clear restriction of water diffusion of the lesion (from right to left:  $b = 1000/400/0$  s/mm<sup>2</sup>, ADC map).



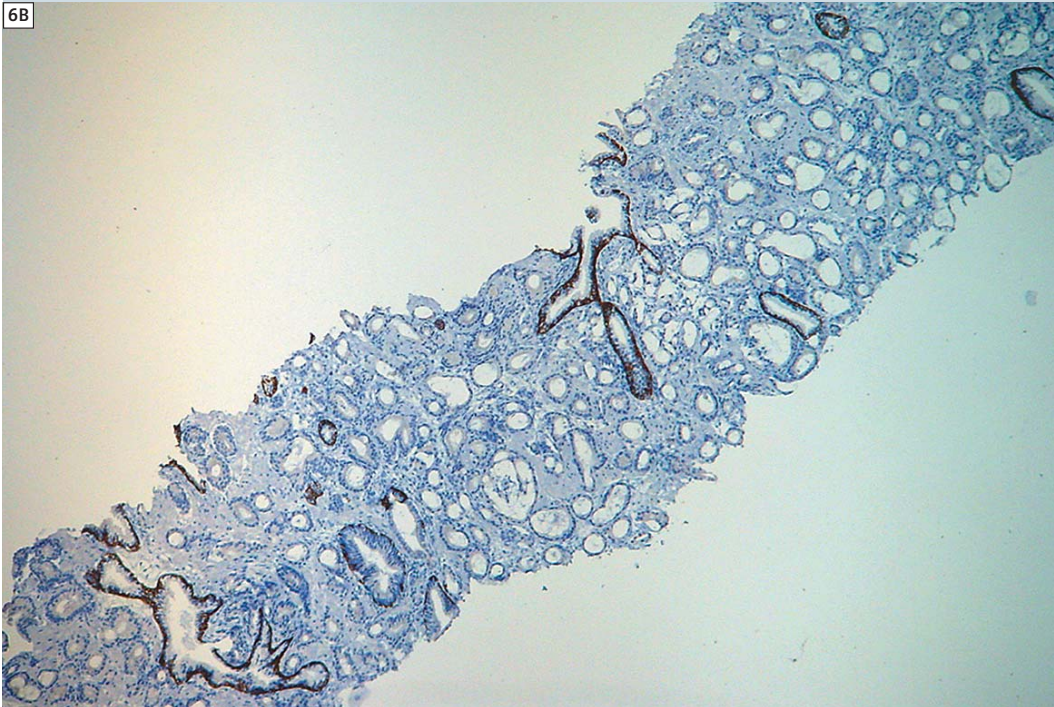
**5** T2w TSE for intervention planning; the transrectal inserted needle guide points directly to the medial portion of the suspicious lesion (image acquired at 1.5 Tesla with a combination of the Tim Spine and Body Matrix coil and without use of an endorectal coil).

6A



**6A** Histology specimen demonstrating infiltrates of a moderately differentiated tubular adenocarcinoma (Gleason score 2 + 3 = 5).

6B



**6B** Anti-cytokeratin 5/6 immunostaining highlighting some non-neoplastic glands with ck 5/6-positive basal cells.

#### References

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