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IMAGE OF THE MONTH

Flip-flop phenomenon on dual SSTR PET and amino acid PET in a case of recurrent meningioma with malignant transformation

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Keywords [^{18}F]FET · [^{18}F]SiTATE · Somatostatin receptor · PET imaging · Differential diagnosis · Dedifferentiation

Amino acid PET is used for glioma imaging but has no established role in meningioma [1, 2]. We present a "flip-flop" constellation on SSTR and amino acid PET in meningioma that enabled to detect unrecognized malignant tumor tissue. A 65-year-old patient in continuous clinical follow-up presented with a new contrast-enhancing lesion on MRI in the left cerebral peduncle (red arrows), 5 years after radiotherapy of a left temporal suspected low-grade meningioma, and 1 year after its resection (revealing atypical meningioma CNS WHO grade 2). The patient received ongoing everolimus/octreotide for dural tumor remnants (green arrows). MRI findings were suggestive of reactive changes but could not exclude vital tumor. SSTR-targeted PET/CT with 187 MBq [^{18}F]SiTATE showed markedly increased SSTR-expression at the known residue, whereas the adjacent new lesion only showed low tracer uptake, suggesting radiation necrosis [3]. Due to uncommon late-onset after radiotherapy, additional amino acid PET with 173 MBq [^{18}F]FET was performed. In contrast to SSTR-PET, [^{18}F]FET-PET displayed only minor uptake in the known meningioma residue; and while the time-activity curves were continuously increasing in the dynamic analysis, the new lesion showed markedly increased [^{18}F]FET uptake, typical for malignant tumor tissue. Taken together, the findings were suggestive for meningioma recurrence with signs of dedifferentiation and malignant transformation. Stereotactic biopsy revealed malignant tumor tissue but was inconclusive regarding the tumor type. Eventually, surgical resection of the new lesion revealed malignant meningioma, now classified as CNS WHO grade 3, including homozygote CDKN2A/B deletion in the DNA-methylation profile [4], which was not present in the initial CNS WHO grade 2 tumor. Additional amino acid PET imaging in meningioma may help to identify

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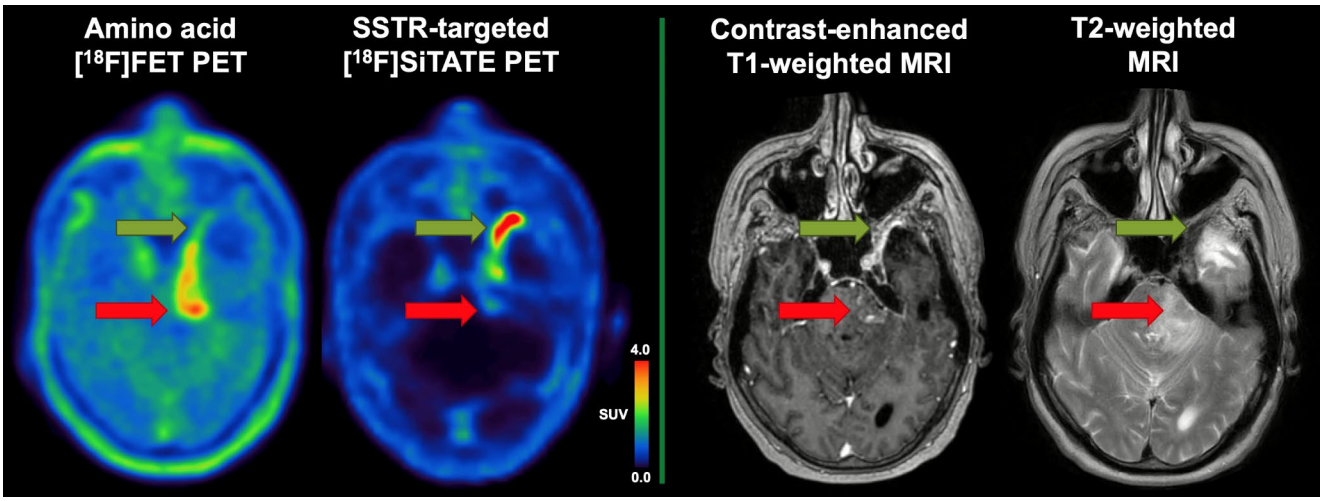

metabolically active dedifferentiated tumor tissue in cases with equivocal previous imaging findings.

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Data availability The datasets used and/or analyzed during the current study are presented in the manuscript.

Declarations

Ethics approval The analysis was performed in compliance with the principles of the Declaration of Helsinki. No identifiable patient data is included in the manuscript, in this respect the right to informational self-determination is not affected. The patient provided written informed consent for the imaging studies within clinical routine. In accordance with the ethics committee of the Ludwig-Maximilians-University of Munich this work is not subject to review.

Competing interests AH reports compensation for scientific consulting by ABX advanced biochemical compounds. JCT reports travel cost reimbursement from Servier. MB received consulting/speaker honoraria from Life Molecular Imaging, GE healthcare, and Roche, and reader honoraria from Life Molecular Imaging. NLA has received honoraria for consultation or advisory board participation from Novartis, Advanced Accelerator Applications, Servier, and Telix Pharmaceuticals; and has received research funding from Novocure. The remaining authors have no relevant financial or non-financial interests to disclose.

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