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LETTER TO THE EDITOR

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Influence of oral protein intake on [^{18}F]FET uptake in brain tumours

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To the editor

Chehri et al. recently published a paper on the influence of oral protein intake on O-(2-[^{18}F]fluoroethyl)-L-tyrosine ([^{18}F]FET) uptake in positron emission tomography (PET) studies of gliomas [1]. We would like to compliment the authors for this important study, which is highly relevant for amino acid PET of brain tumors in clinical practice. The authors report that protein intake before a [^{18}F]FET PET scan decreases tracer uptake in both healthy appearing brain and gliomas to a similar extent thus leading to similar tumour-to-brain ratios (TBR) as in fasting conditions. The authors conclude that TBR of [^{18}F]FET PET are not significantly influenced by varying levels of amino acids in the plasma. Nevertheless, the fasting prior to amino acid PET should be recommended, but patient non-compliance may not necessitate rescheduling.

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The results by Chehri et al. are in accordance with previous competition studies in patients with glioma using L-[methyl-[^{11}C]-methionine [2] and the Single-Photon-Emission-Computed-Tomography (SPECT) tracer 3-[^{123}I]iodo-α-methyl-L-tyrosine ([^{123}I]IMT) [3]. All of these amino acids are predominantly transported via the L-type amino acid transporter (LAT) system subtypes LAT1 and LAT2 [4, 5].

We would like to point out that an important aspect that is not discussed in the study, i.e., whether these observations could also be valid for brain metastases. Amino acid PET is increasingly being used for diagnosing brain metastases relapse and response assessment [6].

Our previous publication using [^{123}I]IMT SPECT provided valuable information in this regard. In that comparative study, in addition to five gliomas, two meningiomas and one brain metastasis were examined. In contrast to gliomas, TBR increased significantly in these tumors during amino acid infusion (range, 30–73%). This was caused by a decrease of tracer uptake in the normal brain tissue, while tracer uptake in meningiomas and the brain metastasis remained constant [3]. A plausible explanation for this observation may be that transport of neutral amino acids into the brain tissue differs significantly from transport into other tissues of the body. The Michaelis Menten constant for neutral amino acid transport in tissues other than the brain is far above physiological levels, i.e., tissue other than the brain are independent of competitive effects in vivo [7]. Since meningiomas and brain metastases (in contrast to gliomas) belong to extracerebral tissues, no competitive effect is expected at physiological

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amino acid levels, which are not exceeded by a common protein meal.

Although the evidence is limited, it is possible that oral protein intake in patients with brain metastases can impact TBR measurements of [^{18}F]FET uptake or other amino acid tracers.

Until there is further evidence, we recommend careful monitoring of protein intake prior to the PET examination of patients with brain metastases, especially during response assessment.

Abbreviations

[^{18}F]FET O	(2-[^{18}F]fluoroethyl)-L-tyrosine
PET	Positron emission tomography
SPECT	Single photon emission computed tomography
TBR	Tumour-to-brain ratio
[^{123}I]IMT	3-[^{123} I]iodo-α-methyl-L-tyrosine
LAT	L-type amino acid transporter
LAT1	L-type amino acid transporter subtype 1
LAT2	L-type amino acid transporter subtype 1

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