Interesting image

**A vascular lesion mimicking a primitive brain tumour in a patient examined by $^{18}$F-choline PET/CT and MRI**

Una lesión vascular imitando un tumor cerebral primitivo en un paciente examinado con PET $^{18}$F-colina/TAC y RM

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A 67-year-old man with headache and dizziness was submitted to a contrast-enhanced CT of the brain that showed an area of non-homogeneous contrast enhancement in the right temporal lobe. Initially, the MRI was not performed, due to a metallic sliver in the skull. A PET/CT with $^{18}$F-choline, carried out to obtain a metabolic characterization of the brain, showed an area of focal uptake in the right temporal lobe (SUVmax: 11) with surrounding area of oedema, as evident in axial PET (a), CT (a′) and PET/CT views (a″). Considering both the anatomic and functional findings, a neoplastic brain lesion was suspected (Fig. 1).

Subsequently, the preoperative anti-oedema premedication allowed a significant clinical improvement; a further CT showed unexpected reduction of the size of the lesion. Therefore, in accordance with the clinicians, we supposed a vascular disease. After the surgical extraction of the sliver in the skull, the MRI was performed and the results were suggestive for a vascular lesion with blood–brain-barrier disruption and haemorrhagic transformation, in T1-weighted post-contrast (b) and T2-FLAIR axial views (c).

Three months after, additional PET/CT with $^{18}$F-choline and MRI showed meaningful reduction of the uptake (SUVmax: 3.1) and the oedema (d, d′, d″) and a lacunar area on T1-weighted (e) and T2-FLAIR axial views (f). Therefore, the diagnosis of a post-haemorrhagic vascular lesion was confirmed.

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**Fig. 1.** Whole skull images. Upper side. Initial PET, CT and PET/CT axial views (a, a′, a″) of a suspected brain lesion with high tracer uptake in the right temporal lobe. Corresponding MR T1-weighted post-contrast and T2-FLAIR axial views (b, c) show vascular lesion with blood–brain-barrier disruption and haemorrhagic transformation in the same side. Bottom side. Post-treatment PET, CT and PET/CT axial views (d, d′, d″) show reduction of the uptake in the right temporal lobe. Corresponding MR T1-weighted post-contrast and T2-FLAIR axial views (e, f) show a lacunar area, confirming the diagnosis of a vascular haemorrhagic lesion.

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It is well known that $^{18}$F-choline is a marker of lipogenesis and a surrogate of rapid synthesis of cell membrane in the neoplasms; nevertheless, the $^{18}$F-choline is a non-specific tumour tracer. As known in literature, caution is mandatory when we diagnose neoplastic lesions $^{18}$F-choline avid, because of a large amount of false positive cases and pitfalls with high tracer uptake, as well described for inflammation and benign tumours, especially in the brain.

In our report, the uptake of the tracer was associated to a vascular lesion, mimicking the metabolic activity of a tumour, consequent to the damage of the blood–brain-barrier and the activation of some cellular types such as macrophages and fibroblasts (with an high rate of lipogenesis). Moreover, similar false positive findings are already known for other radiopharmaceuticals.

In conclusion, $^{18}$F-choline PET/CT seems not suitable for characterization of suspected brain lesions. The necessary correlation with MRI is of the utmost importance.

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**Conflict of interest**

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