Heme products post-radiofrequency ablation obscure tumor recurrence on MR but not on PET-CT

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A 76-year-old male with non-small-cell lung cancer, post lobectomy, presented with hepatic metastatic disease and underwent radiofrequency ablation (RFA), a minimally invasive and safe approach for treatment of liver tumors [1]. Gadolinium-enhanced MRI of the patient performed at our institution 5 months post-RFA reported increased T1 signal at the RFA site believed to be post-RFA blood products (Fig. 1). RFA leads to palliation, increased survival, and is better tolerated than other ablative techniques. It has also been associated with a low rate of local recurrence [2]. Post-RFA, the target lesion typically has hyperintense signal with T1-weighting, low signal on T2-weighting, and is non-enhancing following post-gadolinium administration. Recurrent disease typically demonstrates new enhancement, increased size, and development of T1-weighted hypointense and T2-weighted hyperintense regions [3–5].

Subsequent positron emission tomography/computerized tomography (PET/CT) of the patient demonstrated focal FDG uptake on the corresponding sagittal image, at the border of the prior RFA ablation zone, with maximal SUV of 6.9, characteristic for recurrent hepatic metastasis (Fig. 2). The photopenic area was at the epicenter of the RFA site. PET/CT imaging is also used to monitor residual

tumor or recurrence after RFA. Lesions that show increased 18-fluorodeoxyglucose (FDG) uptake on PET become photopenic immediately after RFA, suggestive of complete ablation. Focal areas of increased FDG uptake within the ablated zone are suspicious for residual or recurrent disease. Reactive tissue is typically present in the periphery of the ablated lesion and has uniform low-grade FDG uptake, unlike the focal nodular intense uptake observed with active tumor [6–10].

Fig. 1 Gadolinium-enhanced MRI of a 76-year-old male with non-small-cell lung cancer who presented with hepatic metastatic disease and underwent radiofrequency ablation (RFA). Arrows indicate what is believed to be post-RFA blood products

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Fig. 2 a–c Positron emission tomography/computerized tomography (PET/CT) demonstrates focal FDG uptake on the sagittal image. The photopenic area (*arrowheads*) is at the epicenter of the RFA site

Fig. 3 PET/MRI fusion illustrates the area of FDG uptake (*arrows*), representing the recurrent tumor, to be at the edge of the intense T1 signal abnormality (*arrowheads*)

PET/MRI fusion (Fig. 3) completed on a dedicated Mim-Vista 5.2 (Cleveland, OH) workstation illustrates the area of FDG uptake, representing the recurrent tumor, to be at the edge of the intense T1 signal abnormality and which

Fig. 4 Pathology results showed sheets and cords of poorly differentiated cells displaying pleomorphism and hypochromasia with a high nuclear-cytoplasmic ratio, prominent nucleoli, and frequent mitoses. The uninvolved liver showed centrilobular congestion (*star*)

actually corresponded to subtle gadolinium enhancement that was difficult to differentiate from adjacent post-RFA blood products on T1 signal on MR. Subtle T1 post-gadolinium enhancement adjacent to already intense T1 signal from blood products may be overlooked on MRI but more readily detected as an FDG-avid lesion on PET. PET/CT is superior to anatomic imaging in the surveillance of patients treated with RFA for malignant hepatic tumors and is more cost-effective [8, 11]. Lesions that on CT or MR have no enhancement or diffuse peripheral enhancement may often have focal uptake on PET/CT. This added information can be used to direct biopsy or repeat RFA [12].

Patient underwent surgical resection of liver segment VI. Pathology report demonstrated sheets and cords of poorly differentiated cells displaying pleomorphism and hypochromasia with a high nuclear-cytoplasmic ratio, prominent nucleoli, and frequent mitoses. The uninvolved liver showed centrilobular congestion.

Conflict of interest We declare that we have no conflict of interest in relation to this article.

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