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IMAGE OF THE MONTH

[^{68}Ga]Ga-DOTA-FAPI-04 PET/CT imaging of benign pulmonary solitary fibrous tumour

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A 27-year-old man with persistent cough and headache for 2 months was referred to our hospital for further evaluation after a chest radiography revealed a large mass in the right lung. History revealed that he had pulmonary tuberculosis and received anti-tuberculous treatment 2 years previously. Enhanced chest CT showed a well-circumscribed lesion in the right lung with a round shape, smooth margin, homogeneous density, and heterogeneous enhancement (a, arrowheads, approximately 4.0 cm in size), indicating a lung tumour; therefore, malignancy could not be ruled out. For further evaluation, the patient was enrolled in the clinical trial of [^{68}Ga]Ga-DOTA-FAPI-04 (FAPI) in solid tumours approved by the institutional review board of our hospital (AHSWMU-2020-035), and written informed consent was obtained from the patient. FAPI PET/CT revealed that the pulmonary mass had intense FAPI uptake (b, c, curved arrows, SUVmax = 11.8). Based on these CT and PET/CT findings, primary pulmonary malignancy was suspected. Additionally, there was moderate FAPI uptake in the consolidated lesions of the right upper lobe (d, dotted arrows, SUVmax = 2.2), which may be the result of tuberculosis. Moreover, mild activity in the right temporal bone (e, solid arrows, SUVmax = 1.8) was noted on the axial images of the brain, which showed expansive bone destruction with "ground-glass" appearance, well-defined borders, and intact overlying bone, pathognomonic of fibrous dysplasia. Finally, the pulmonary mass was surgically resected due to its size and the suspicion of malignancy. The pathologic diagnosis was a benign pulmonary solitary fibrous tumour and showed a tangled network of fibroblast-like cells squeezed in between abundant collagen fibres and branching vessels. FAP alpha immunohistochemistry revealed positive staining of tumour cells (+++), with negative staining of collagen fibres and vascular endothelial cells (f). Haematoxylin-eosin staining of the upper lung lesion biopsy was consistent with tuberculosis (g).

[^{68}Ga]Ga-DOTA-FAPI is a novel PET agent developed for tumours, as fibroblast activation protein is overexpressed in cancer-associated fibroblasts [1, 2]. Solitary fibrous tumour (SFT), a rare fibroblastic mesenchymal neoplasm, also resulted in a focally increased FAPI activity in our case, which may have been caused by the transformation of tumour cells into fibroblasts and/or myofibroblasts [3]. In addition, the FAPI uptake of tuberculous (TB) lesions was relatively lower than that in previously published research, which could be due to a residual fibrotic process after anti-tuberculous treatment [4]. Fibrous dysplasia (FD) is a rare, benign bone disease with fibroblastic proliferation [5]. This may explain the FAPI uptake by FD, and the corresponding CT images make it easier to distinguish FD from bone metastases. Our case shows that the possibility of SFT, TB, and FD should be considered when similar FAPI PET/CT findings are reviewed.

Huipan Liu, Lin Liu and Lin Chen contributed equally to this work.

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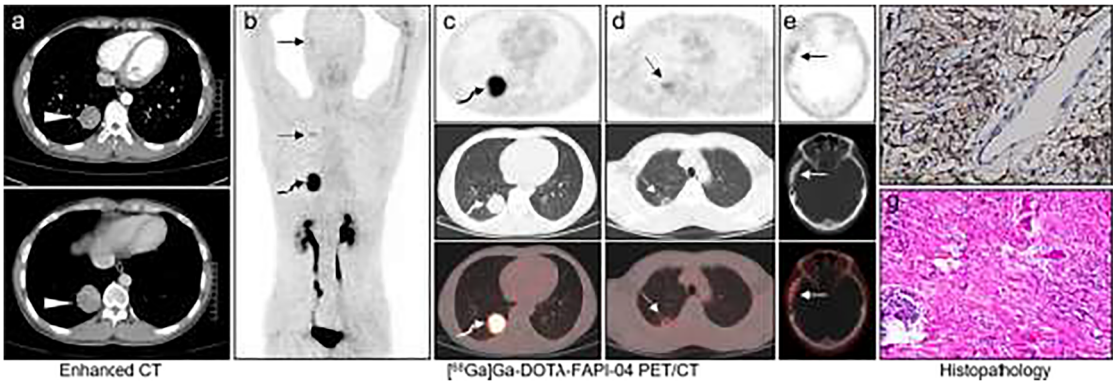

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Informed consent and ethical approval This study was approved by the institutional review board of our institution (AHSWMU-2020-035), and written informed consent for publication of this report was obtained from the patient.

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