Atypical fibrous histiocytoma mimicking a cutaneous metastasis on F-18 fluoro-2-deoxyglucose positron emission tomography in a patient with stage IV melanoma

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Key words: atypical fibrous histiocytoma; benign fibrous histiocytoma; dermatofibroma; melanoma; PET-avid; PET-CT.

INTRODUCTION

Dermatofibroma or fibrous histiocytoma (FH) is a common benign skin tumor typically located within the dermis. They are most common during the third to fifth decade of life and demonstrate female predominance. Although dermatofibroma may occur after trauma, their pathogenesis is unknown. Dermatofibroma classically appears as a firm nodule, typically on the lower extremities. Diagnosis is usually clinical but can be confirmed via histology. There are several clinical and histological variants, leading to diagnostic uncertainty in unusual cases.[1] Atypical fibrous histiocytoma (AFH) is a histologically distinct dermatofibroma subtype that is rarely reported.[2] [18F] Fluorodeoxyglucose (FDG) positron emission tomography-computed tomography (PET-CT) is an imaging modality used to detect tissues with high glucose metabolism such as melanoma metastases. Herein, we report a rare case of an AFH with activity on FDG PET-CT mimicking a cutaneous metastasis in a patient with melanoma.

Abbreviations used:

AFH:	atypical fibrous histiocytoma
FDG:	fluorodeoxyglucose
FH:	fibrous histiocytoma
GLUT1:	glucose transporter 1
PET-CT:	positron emission tomography-computed tomography
SUVmax:	maximum standardized uptake value

CASE REPORT

A 64-year-old man with a history of stage IV melanoma of the scalp and metastasis to the lung, who had a complete response after treatment with ipilimumab, nivolumab, and granulocyte-macrophage colony-stimulating factor, presented with findings concerning for metastatic melanoma recurrence on FDG PET-CT 7 years after diagnosis. The PET-CT was performed to further evaluate pulmonary nodules seen on CT after the patient presented with lower respiratory symptoms. PET-CT was significant for focal nodular FDG uptake with a maximum standardized uptake value (SUVmax) of 7.98 in the subcutaneous tissue of his back (Fig 1). The reference SUVmax of the liver was 3.96. His pulmonary nodules showed no PET avidity or change in size when compared to a PET-CT 7 years prior. On a physical exam, the hypermetabolic lesion on the back corresponded to an amelanotic 7 mm firm pink papule (Fig 2). An 8 mm punch biopsy of the lesion was performed. Biopsy results demonstrated a highly cellular dermal proliferation, without epidermal involvement, composed of pleomorphic

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Funding sources: This research was supported by the NIAMS Intramural Research Program (grant ZIA AR041224).

Patient consent: The authors obtained written consent from patients for their photographs and medical information to be published in print and online and with the understanding that this information may be publicly available. Patient consent forms were not provided to the journal but are retained by the authors.

IRB approval status: Not applicable.

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JAAD Case Reports 2024;52:166-8.
2352-5126

https://doi.org/10.1016/j.jdcr.2024.07.032

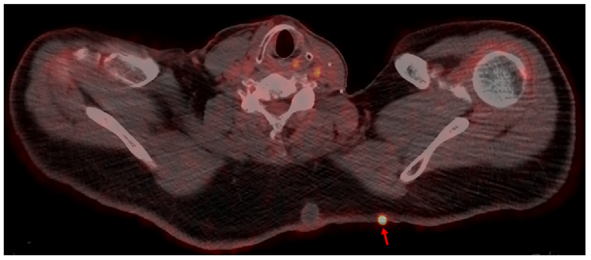

Fig 1. Axial fused positron emission tomography-computed tomography (PET-CT) demonstrates a hypermetabolic cutaneous focus along the left upper back with SUV-max measuring 7.98 (*arrow*). A photopenic epidermal inclusion cyst is incidentally noted towards the *midline*. There was otherwise no metabolic evidence for metastatic disease.

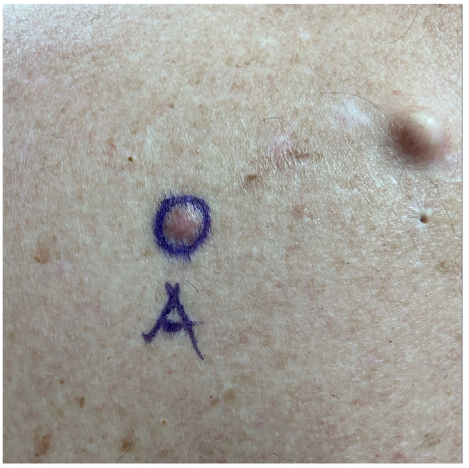

Fig 2. Atypical fibrous histiocytoma on the left upper back, *circled* and marked with "A". The medial lesion was a histologically confirmed epidermal inclusion cyst.

spindled to epithelioid cells with scattered enlarged, atypical nuclei and multinucleated forms. Peripheral collagen trapping was noted. Neither mitotic figures nor inflammatory infiltrate were identified (Fig 3). CD10, CD68, and factor XIIIa were diffusely positive. Diffuse glucose transporter 1 (GLUT1) staining was present (Fig 4). Staining for SOX10, Melan-A, AE1/AE3, and CD34 were negative. The patient was diagnosed with an AFH and underwent complete narrow margin excision of the lesion.

DISCUSSION

AFH were first described by Fukamizu et al in 1983, but since then have been rarely reported.[2] In a review of 59 AFH cases, they were distinguished on histology by pleomorphic spindle cells and multinucleated giant cells. Up to one-third of cases exhibit mitotic figures. In AFH, these findings are present in the background of classical FH features such as

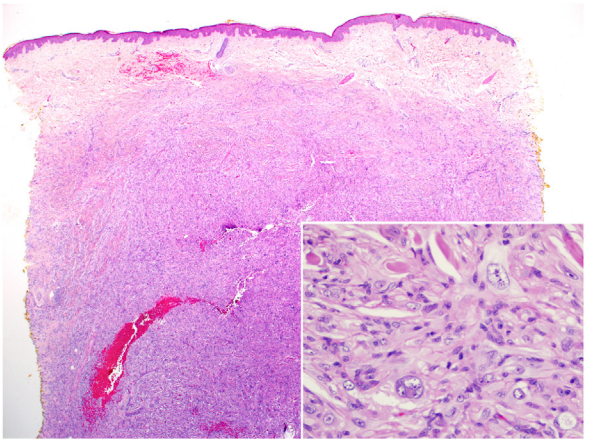

Fig 3. Histology of atypical fibrous histiocytoma from punch biopsy specimen. A grenz zone is present above a dense dermal proliferation of pleomorphic spindled to epithelioid cells with scattered enlarged, atypical nuclei and multinucleated forms. The lesion extended into the subcutis and peripheral collagen trapping was noted. Hematoxylin and eosin staining. Original magnification 20×, inset original magnification 200×.

primarily dermal involvement, spindle cells in a storiform pattern, and trapping of peripheral collagen bundles.[3] With marked pleomorphism and mitotic figures possible, AFH may be histologically mistaken for more serious lesions such as a pleomorphic sarcoma. It is important to distinguish this FH variant as it tends to have a higher rate of local recurrence and the potential for distant metastases.[3]

FDG uptake on PET-CT in this patient with a history of stage IV melanoma raised significant concern for recurrence. FDG PET-CT is routinely used to detect malignancy during staging or surveillance. Cancer cells typically exhibit a high expression of GLUT glucose transporters, which allows for the active intracellular transport of FDG and thus, an increased signal on FDG PET-CT.[4] However, nonmalignant conditions, mainly inflammation and some benign tumors, can produce false-positive signals.[5] FH are not routinely detected on FDG PET, although there are reports of PET-avid dermatofibromas.[6-8] The elevated SUVmax values in prior cases of PET-avid dermatofibromas were comparable to those seen in melanoma lesions. For comparison, in a retrospective study of 101 malignant melanoma lesions, the mean SUVmax was 9.98,[9] whereas prior dermatofibromas of the chest wall[6] and back[7] demonstrated SUVmax values of 18 and 10, respectively. Although GLUT1 staining is not routinely used for evaluating PET-avid lesions, the intensity of GLUT1 staining has been correlated with FDG uptake in several cancers, including melanoma.[4] Given the elevated SUVmax

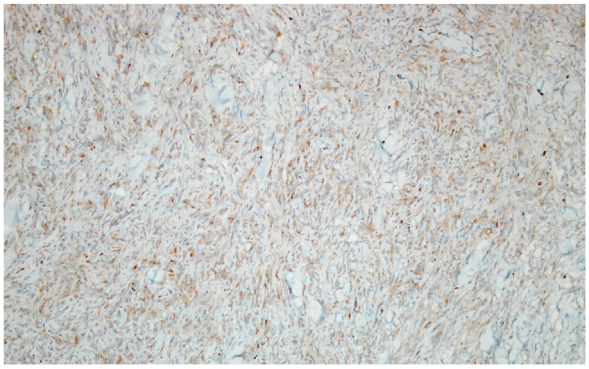

Fig 4. GLUT 1 staining of atypical fibrous histiocytoma from punch biopsy specimen. GLUT1 staining was diffusely positive. Original magnification 100×.

in the present case, we performed GLUT1 immunohistochemistry to explore a possible association. Although positive GLUT1 staining has been reported in some dermatofibroma lesions,[10] it was not assessed in the prior reported cases of PET-avid dermatofibromas. We posit that glucose hypermetabolism is not typical of FH as they are common lesions yet are rarely detected by PET-CT. The atypical histological features and expression of the GLUT1 glucose transporter in the present case may be correlates of the lesion's PET avidity. This case also illustrates the specificity limits of FDG PET-CT in detecting metastatic melanoma and why, whenever possible, biopsy should be used to confirm the diagnosis.

Conflicts of interest

None declared.

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