

CASE REPORT

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# Giant adrenal metastasis of malignant melanoma: impact of 18F-FDG PET/CT in early assessment of dramatic response to immunotherapy: case report

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## Abstract

**Background** This case represents one of the largest adrenal metastases in the literature and highlights the importance of accurate imaging in clinical management of patients with advanced malignant melanoma.

**Case presentation** A 67-year-old female with an ulcerated malignant melanoma presented with an asymptomatic 18-cm left adrenal mass on 18F-FDG PET/CT staging. After two cycles of combined systemic immunotherapy, an impressive shrinkage of the adrenal metastatic tumor was observed on 18F-FDG PET/CT imaging.

**Conclusions** The case emphasizes the potential of 18F-FDG PET/CT as a functional imaging modality for accurate staging and precise early assessment of response to immunotherapy. Overall, this report highlights the importance of accurate imaging for the effective management of adrenal metastases in melanoma patients.

**Keywords** Malignant melanoma, 18F-FDG PET/CT, Adrenal metastases

## Background

Malignant melanoma is one of the most common primary sites for adrenal metastases [1, 2]. Adrenal metastases are often asymptomatic and mostly detected as a part of multiorgan metastases [3]. 18F-FDG PET/CT has demonstrated high overall accuracy in detecting distant metastases and, in combination with cerebral MRI, is the preferred imaging approach for staging metastatic melanoma [4]. Systemic mono- or combined immunotherapy (nivolumab plus ipilimumab) is currently considered an

initial treatment option in unresectable, non-isolated adrenal metastases. Nivolumab plus ipilimumab is preferred therapy for aggressive feature disease [5–7]. To the best of our knowledge, this case presents one of the largest adrenal metastases based on the literature review up to 2023 [1, 8] with a remarkable response to two cycles of immunotherapy.

## Case presentation

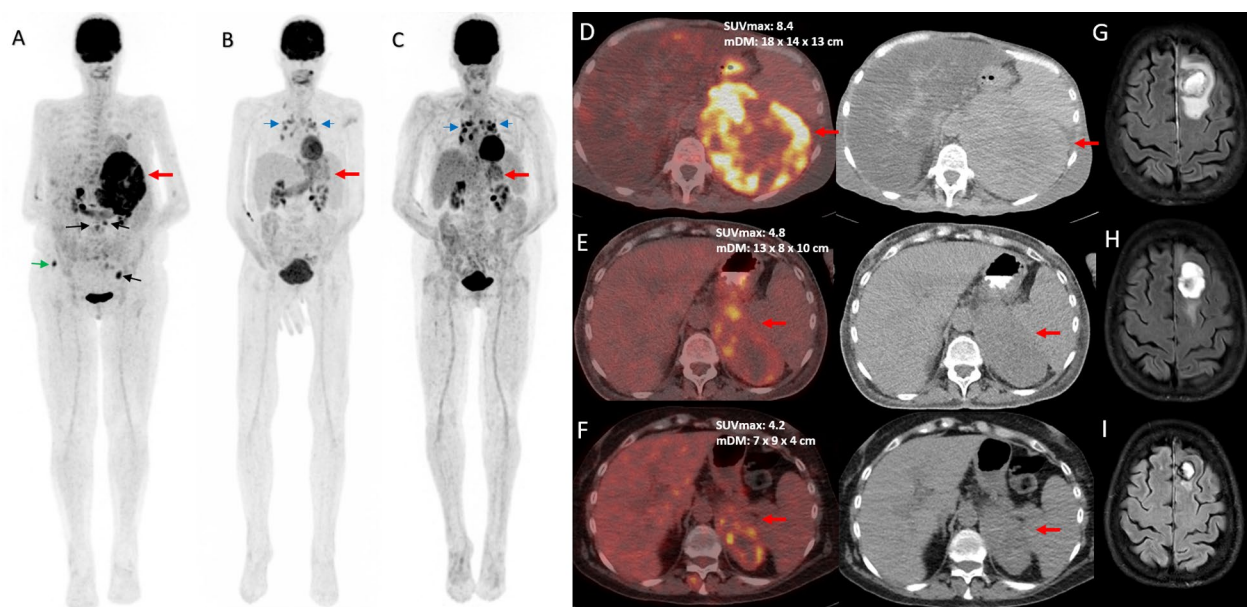
A 67-year-old female presented with cachexia and a left arm 5 cm skin ulcer. Two weeks after excision of ulcerated malignant melanoma, 18F-FDG PET/CT was performed for primary staging that revealed an 18F-FDG-avid 18-cm left adrenal mass, ascites, 18F-FDG-avid abdominopelvic lymph nodes and intramuscular right gluteal metastasis (Fig. 1A, D). Concurrent brain MRI showed metastatic lesions, most prominently a lesion in the left frontal lobe with surrounding edema

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**Fig. 1** 18F-FDG PET/CT maximum intensity projection (MIP) (A, B, C), axial 18F-FDG PET/CT fusion and CT (D, E, F) and brain T2 Flair MRI axial images (G, H, I) before treatment (A, D, G), 2 months (B, E, H) and 6 months post-treatment (C, F, I). 18F-FDG PET (MIP, A) shows giant left adrenal hypermetabolic metastatic lesion (SUVmax: 8.4, mDM: 18 × 14 × 13 cm) (red arrow) with multiple mesenteric (SUVmax: 4.6, mDM: 1.1 cm) and left iliac lymph node metastases (SUVmax: 6.3 mDM: 1.3 cm) (black arrows). In addition, a focal right gluteal muscular metastasis was seen (SUVmax: 5.1, mDM: 1.0 cm) (green arrow). Follow-up examinations after combined immunotherapy (nivolumab plus ipilimumab) (B, C and E–I) show remarkable response to treatment on 2- and 6-month images; 30% and less than 10% of adrenal lesion volume remained, respectively (SUVmax: 4.8 and 4.2, mDM: 13 × 8 × 10 cm and 7 × 9 × 4). But there is an interval decrease in size of brain metastases. Complete resolution of mesenteric and iliac lymph nodes and intramuscular gluteal lesion is also evident. 18F-FDG PET (B, C) shows increased 18F-FDG uptake on mediastinal and hilar lymph nodes suggestive of immune-mediated granulomatous reaction (blue arrows). 18F-FDG PET/CT (B, C, E, F) and brain MRI (H, I) of post-treatment (2-month and 6-month interval) reveal remarkable treatment response, even after two cycles of the treatment

(Fig. 1G). Combined immunotherapy with nivolumab and ipilimumab and stereotactic radiation for the brain were started. Evaluation of response to treatment with 18F-FDG PET/CT and brain MRI after two cycles of immunotherapy showed remarkably impressive shrinkage of the adrenal and brain metastatic lesions and complete resolution of the lymph node and muscular metastases (Fig. 1B, E, H). Subsequent follow-up conducted six months later demonstrated continued tumor shrinkage on 18F-FDG PET/CT and MRI (Fig. 1C, F, I).

## Conclusions

Considering costs and immune-related adverse effects of these novel therapies, defining an accurate imaging modality for staging and interim assessment of the response to therapy is of great importance. Although this case shows the potential of 18F-FDG PET/CT for assessment of response to immunotherapy, to determine the role of 18F-FDG PET/CT during the treatment course of advanced melanoma, well-designed studies with standardized scanning protocols, including clinical

parameters and comparison with other imaging modalities are needed.

## Abbreviations

18F-FDG	2-[ <sup>18</sup> F]Fluoro-2-deoxy-d-glucose
PET/CT	Positron emission tomography/computed tomography
MRI	Magnetic resonance imaging

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## Author contributions

The authors performed the PET/CT scan and wrote the manuscript. All authors read and approved the final manuscript. This manuscript was read and approved by all the authors, which represent our honest report.

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## Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent to participate

There was no conflict of interest in both the designing and accomplishment of this study.

### Consent for publication

The authors confirm that the statements of written informed consent from legally authorized representatives/parents/guardians are available.

### Competing interests

The authors declare no competing interests.

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