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Deceptive Brown Adipose Tissue

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A 23-year-old female presented with headache, palpitation, and hypertensive spells. There was no similar family history. Twenty-four (24) hour urine testing showed elevated normetanephrine level with normal metanephrines [metanephrines 123 mcg/24 hrs (74-297); normetanephrines 5321.16 mcg/24 hrs (73-808)]. A biochemical diagnosis of normetanephrine-secreting pheochromocytoma was made. Considering the age and urine reports, a functional scan was ordered. Imaging with 18-FDG PET CT was done which showed uptake indicative of a large left adrenal mass, as well as uptake in the mediastinal, abdominopelvic, lymph nodes and metabolically active mesenteric, peritoneal and omental thickness. This suggested a left adrenal pheochromocytoma with the possibility of an associated lymphoproliferative disorder or active lesions in brown fat (Figure 1A). To describe these extra-adrenal lesions, a Ga-68

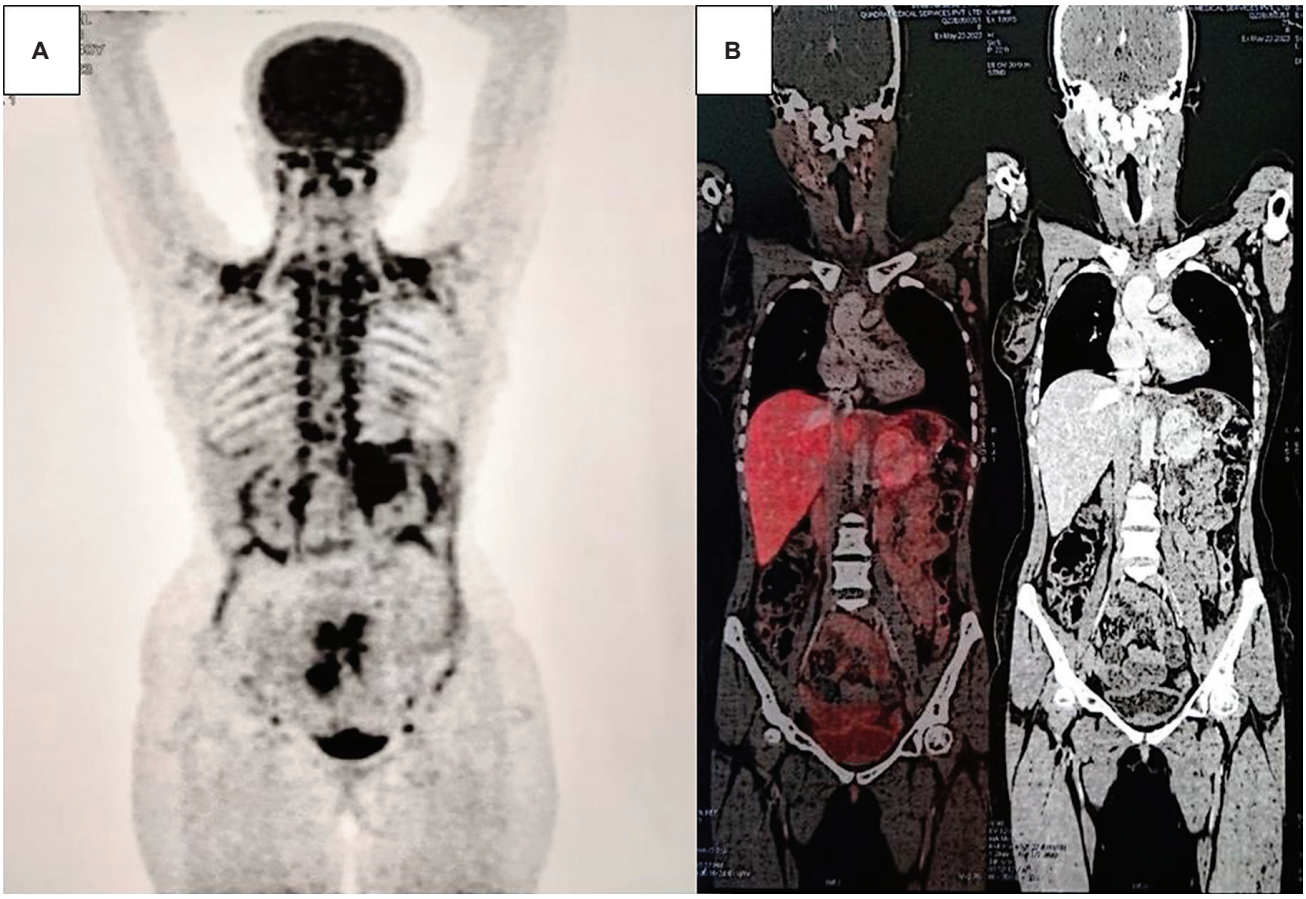

Figure 1. (A) 18-FDG PET CT done showed a large left adrenal mass, mediastinal, abdominopelvic lymph nodes, metabolically active mesenteric, peritoneal, and omental thickness suggestive of brown fat uptake; **(B)** Ga-68 DOTANOC PET CT showing a diffuse somatostatin receptor-expressing large soft tissue mass lesion in left adrenal likely pheochromocytoma.

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DOTANOC PET CT was obtained which showed a diffuse somatostatin receptor-expressing large soft tissue mass lesion in the left adrenal likely to be pheochromocytoma without any other lesion elsewhere in the whole body survey (Figure 1B).

This depicts the confusion created by the metabolically active brown adipose tissue (BAT) in the FDG PET scan. Brown fat is involved in non-shivering thermogenesis and is typically located in the cervical, supraclavicular, mediastinal, and abdominal regions. High uptake in the BAT can make interpretation of the FDG PET report difficult and misleading.[1] Some precautions like avoidance of cold and beta blockers can minimize BAT uptake in FDG-PET scans.

Although it has been found in the literature that even Ga-68 DOTANOC PET CT scan can show BAT uptake,[2] it is far less frequent than with FDG-PET scan. Therefore Ga-68 DOTANOC PET CT should be used for functional imaging of Pheochromocytoma and Paragangliomas (PPGL).[3]

Ethical Consideration
Patient consent was obtained before submission of the manuscript.

Statement of Authorship
All authors certified fulfillment of ICMJE authorship criteria.

CRediT Author Statement
BP: Conceptualization, Software, Validation, Investigation, Resources, Writing – original draft preparation, Visualization, Project administration; **AD:** Software, Formal analysis, Resources, Writing – review and editing, Visualization; **PS:** Conceptualization, Methodology, Software, Validation, Investigation, Data curation, Writing – review and editing, Supervision; **AK:** Conceptualization, Methodology, Validation, Investigation, Data curation, Writing – review and editing; **PK:** Software, Formal analysis, Resources, Writing – original draft preparation, Supervision.

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