Physiologic $^{18}$F-FDG Uptake in Brown Adipose Tissue and Lactating Breast in a Patient with Hodgkin Lymphoma

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We present the case of a young woman with Hodgkin lymphoma exhibiting physiologic $^{18}$F-FDG uptake in brown adipose tissue and lactating breast on consecutive $^{18}$F-FDG PET/CT scans. Both entities are common imaging interpretation pitfalls and should be recognized in oncologic $^{18}$F-FDG PET/CT practice. We review the imaging features and differential diagnosis of these 2 entities and discuss the radiation safety precautions during breastfeeding.

Key Words: brown adipose tissue; lactating; breast; FDG; PET

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Brown adipose tissue (BAT) $^{18}$F-FDG uptake is a well-known entity in oncologic PET/CT practice. Its incidence is associated with younger age, the female sex, low body mass index, and thermogenesis secondary to cold, as well as reaction to administration of mirabegron (1–4). $^{18}$F-FDG uptake in the lactating breast in women of childbearing age is becoming more common given the improved outcomes in cancer patients (5). We present here a young woman with Hodgkin lymphoma exhibiting physiologic $^{18}$F-FDG uptake in both BAT and lactating breast tissue during $^{18}$F-FDG PET/CT surveillance of lymphoma. We aim to enhance awareness about both entities in oncologic PET practice.

CASE REPORT

A 23-y-old woman with a history of classic Hodgkin lymphoma achieved remission after 3 y of chemotherapy. During the clinical course, sequential staging and restaging $^{18}$F-FDG PET/CT was performed, with several scans showing physiologic $^{18}$F-FDG uptake in BAT bilaterally in the neck and paravertebral regions (Fig. 1). There was no suggestive nodal uptake or enlarged nodes on corresponding PET/CT images. On the latest surveillance $^{18}$F-FDG PET/CT scan, tissue in both breasts demonstrated diffusely increased tracer uptake, which was noticed by the PET technologist (Fig. 2). Further review of $^{18}$F-FDG PET/CT images show denser breast tissue than in prior studies. On interview by the nuclear radiologist, the patient revealed she was breastfeeding an infant. To avoid unnecessary exposure of the infant to radiation, the patient was instructed to cease breast feeding for 12 h.

DISCUSSION

Unlike white adipose tissue, which serves as an energy storage site, BAT serves to generate heat in response to cold exposure and food ingestion (1). BAT is usually highly vascularized, rich in sympathetic noradrenergic innervation and $\beta$-adrenergic receptors, and upregulated in mitochondrial activity. It is commonly seen in newborns and adolescents and is more common in women than men. The typical locations for BAT are the neck and supraclavicular areas, whereas atypical locations are the axillary, mediastinal, and retrocrural regions (1,2). Studies have shown that $^{18}$F-FDG uptake in BAT might be reduced by $\beta$-blockers and the benzodiazepine diazepam but is stimulated by mirabegron, a $\beta_3$-adrenergic receptor agonist used to treat overactive bladder (3–5). At our institution, we routinely provide...
warmed blankets during the 1-h $^{18}$F-FDG uptake time to reduce $^{18}$F-FDG uptake in BAT.

On $^{18}$F-FDG PET/CT images, lactating breasts demonstrate symmetrically increased $^{18}$F-FDG uptake, which is regulated by prolactin and stimulated by suckling (6). However, breastfeeding is not a contraindication for $^{18}$F-FDG PET/CT given the short half-life of $^{18}$F and the extremely low excretion of $^{18}$F-FDG in breast milk. The International Commission on Radiological Protection recommends limitation of close contact between mother and nursing child for 4–12 h after $^{18}$F-FDG injection to avoid radiation exposure (7). Using a breast pump during this short period may help with maintaining milk production. The differential diagnosis of $^{18}$F-FDG uptake in glandular tissue of the lactating breast includes bilateral malignancy and mastitis, which usually occurs in a single breast.

CONCLUSION

Physiologic $^{18}$F-FDG uptake in BAT and glandular tissue of the lactating breast is an interpretation pitfall that should be recognized by both nuclear medicine physicians and oncologists. Accurate assessment is crucial to avoid misinterpretation and to guide clinical management and consultations about radiation protection.

DISCLOSURE

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REFERENCES