

## F-18 Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography Muscle Uptake in Antiglutamic Acid Decarboxylase Antibody-positive Stiff-person Syndrome

### Abstract

Antiglutamic acid decarboxylase-65 (anti-GAD65) autoantibodies have been identified in variety of rare neurologic disorders most frequently in stiff-person syndrome (SPS), condition characterized by muscle rigidity and overlying painful spasms, typically affecting axial and limb musculature. In anti-GAD65-related neurologic disorder, malignancy screening is often performed with <sup>18</sup>F-fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT). Here, we present an interesting image of <sup>18</sup>F-FDG PET/CT whole body showing muscle uptake and FDG brain showing thalamic hypometabolism in SPS.

**Keywords:** <sup>18</sup>F fluorodeoxyglucose positron emission tomography/computed tomography, antiglutamic acid decarboxylase-65, muscle uptake, stiff-person syndrome

A 64-year-old female with diabetes mellitus and hypertension presented with bilateral leg pain and difficulty in walking for the last 1 month. Clinical examination revealed stiff contracted muscle with rigidity in extremities. Blood investigations were normal. With suspicion of stiff-person syndrome (SPS), her antiglutamic acid decarboxylase-65 (GAD65) antibody was elevated. She was referred for <sup>18</sup>F-fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) to rule out paraneoplastic etiology. Her blood sugar value was 90 mg/dl and was fasting for 6 h before the study. No insulin or dextrose was administered. FDG PET showed intensely hypermetabolic symmetric muscle uptake in the entire body [Figure 1]. No malignancy was detected. FDG brain images in Scenium software showed hypometabolism in bilateral

thalamus [Figure 2]. She was started on rituximab 500 mg and has good clinical improvement.

Anti-GAD65 autoantibodies have been identified in SPS, condition causing muscle rigidity and painful spasms.<sup>[1]</sup> Association with impairment of  $\gamma$ -aminobutyric acid neurotransmission by anti-GAD65 autoantibodies which results in lack of inhibition leading to relatively hyperexcitable state.<sup>[2]</sup> FDG PET/CT showing muscle uptake seen in nonfasting state with increased glucose level and due to physiological muscle activity after exercise or walking or pathological uptake in polymyositis are reported.<sup>[3]</sup> There are case reports of increased muscle uptake in case of insulinoma<sup>[4]</sup> and Graves' disease.<sup>[5]</sup>

O'Toole *et al.* showed the case of hypermetabolism in muscles in FDG PET/CT in a case of SPS<sup>[6]</sup> Wang

**Koramadai  
Karuppusamy  
Kamaleshwaran,  
Elumalai  
Ramkumar,  
Elumalai  
Senthilkumar<sup>1</sup>**

Departments of Nuclear  
Medicine and <sup>1</sup>Neurology,  
Kovai Medical Center and  
Hospital Limited, Coimbatore,  
Tamil Nadu, India

### Address for correspondence:

Dr. Koramadai Karuppusamy  
Kamaleshwaran,  
Department of Nuclear  
Medicine, Kovai Medical  
Center and Hospital Limited,  
Coimbatore, Tamil Nadu, India.  
E-mail: dr.kamaleshwar@gmail.  
com

Received: 30-05-2022

Revised: 12-08-2022

Accepted: 06-09-2022

Published: 08-06-2023

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Kamaleshwaran KK, Ramkumar E, Senthilkumar E. F-18 fluorodeoxyglucose positron emission tomography/computed tomography muscle uptake in antiglutamic acid decarboxylase antibody-positive stiff-person syndrome. Indian J Nucl Med 2023;38:162-4.

### Access this article online

Website: www.ijnm.in

DOI: 10.4103/ijnm.ijnm\_94\_22

### Quick Response Code:



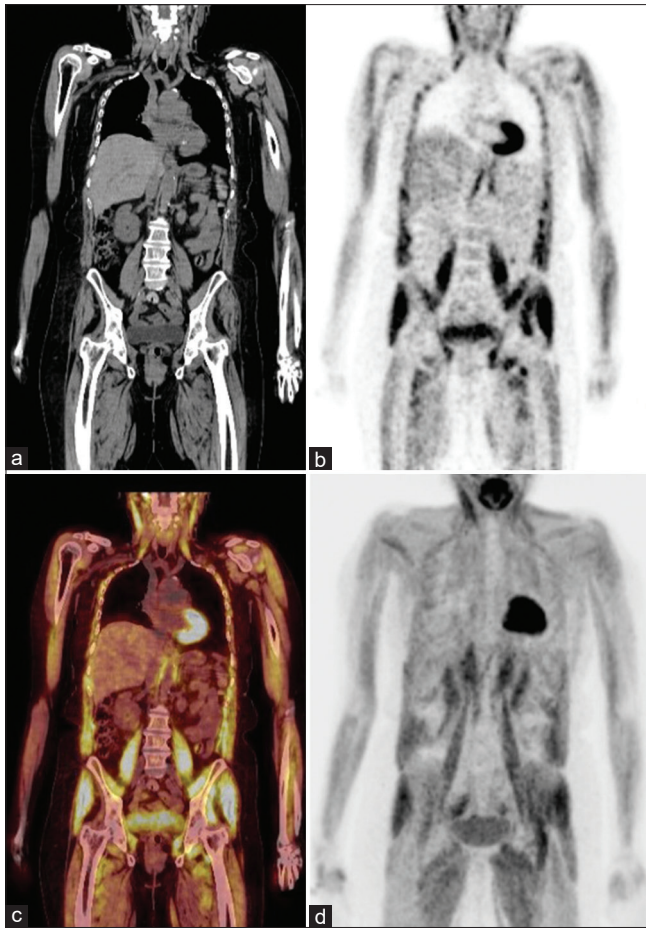


Figure 1: Coronal CT (a), coronal PET (b), coronal fused PET CT (c), MIP (d) F-18 FDG PET/CT showing intensely hypermetabolic whole-body muscle uptake. F-18 FDG PET/CT: <sup>18</sup>F-fluorodeoxyglucose positron emission tomography/computed tomography, MIP: Maximum intensity projection

*et al.*<sup>[7]</sup> showed 50 cases of whole body FDG showing hypermetabolism in muscles in SPS and 30 cases of brain FDG in same patients showing thalamic hypometabolism. Shoulders and upper limbs were most commonly hypermetabolic followed by hips, lower limbs, and axial musculature. The muscle regions involved correlated with clinical muscle involvement in 42% of individuals. The thalamus exhibited hypometabolism as it is an important component of connecting cortex to striatal network, which are affected in various movement disorders. Our case also showed hypermetabolism in most of muscles and hypometabolism in both thalami. In conclusion, SPS showing muscle uptake can be added to list of pathological muscle uptake in FDG PET/CT.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

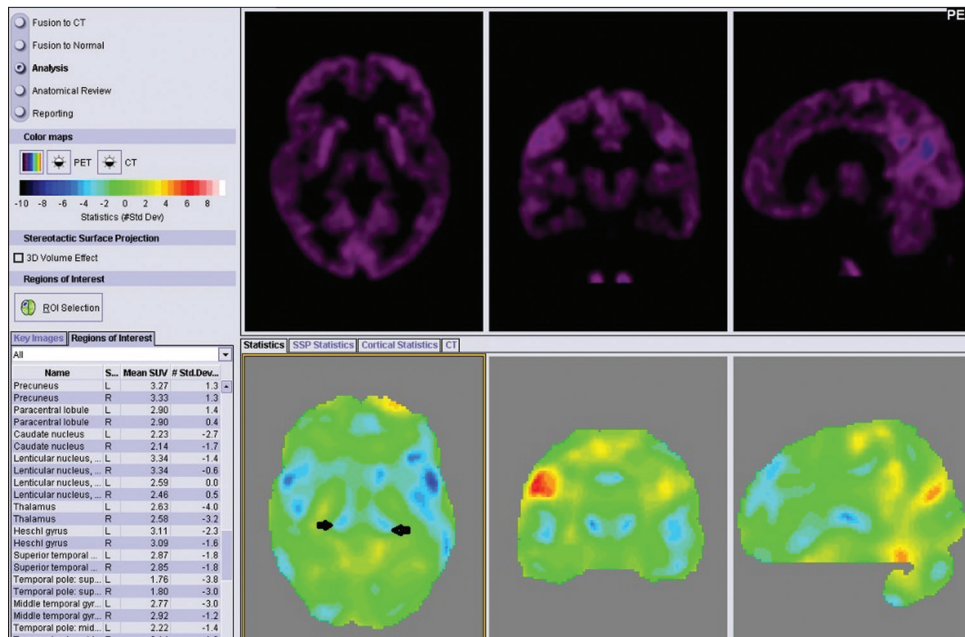


Figure 2: Scenium software images of FDG brain showing hypometabolism in both thalami (black arrows) (3–4 standard deviation less than normal population). Also mild caudate and temporal hypometabolism noted (2–3 standard deviation less than normal). (Blue color indicates hypometabolism). FDG: Fluorodeoxyglucose

## References

1. Dalakas MC, Fujii M, Li M, McElroy B. The clinical spectrum of anti-GAD antibody-positive patients with stiff-person syndrome. *Neurology* 2000;55:1531-5.
2. McKeon A, Robinson MT, McEvoy KM, Matsumoto JY, Lennon VA, Ahlskog JE, *et al.* Stiff-man syndrome and variants: Clinical course, treatments, and outcomes. *Arch Neurol* 2012;69:230-8.
3. Karunanithi S, Soundararajan R, Sharma P, Naswa N, Bal C, Kumar R. Spectrum of physiologic and pathologic skeletal muscle (18) F-FDG uptake on PET/CT. *AJR Am J Roentgenol* 2015;205:W141-9.
4. Kamaleshwaran KK, Bhattacharya A, Chakraborty D, Manohar K, Mittal BR. Diffusely increased muscular uptake of [18F] fluorodeoxyglucose: A clue for the diagnosis of insulinoma? *Eur J Nucl Med Mol Imaging* 2010;37:1800.
5. Santhosh S, Mittal BR, Kashyap R, Bhattacharya A, Singh B. Symmetric increased skeletal muscular uptake of F-18 fluoro-deoxyglucose: A clue for the diagnosis of Graves' disease. *Indian J Nucl Med* 2011;26:155-6.
6. O'Toole O, Murphy R, Tracy JA, McKeon A. Teaching NeuroImages: PET-CT hypermetabolism paralleling muscle hyperactivity in stiff-person syndrome. *Neurology* 2013;80:e109.
7. Wang Y, Sadaghiani MS, Tian F, Fitzgerald KC, Solnes L, Newsome SD. Brain and muscle metabolic changes by FDG-PET in stiff person syndrome spectrum disorders. *Front Neurol* 2021;12:692240.