

⁶⁸Ga-PSMA PET/CT in a case of recurrent Glioblastoma

Abstract

Glioblastoma multiforme (GBM) is a high-grade brain tumor with a high recurrence rate. We present the case of a 57-year-old man with left frontal lobe GBM who was operated on and received radiation therapy in June 2023 and was referred for ⁶⁸Ga-PSMA 11 PET/CT with a clinical suspicion of recurrence. The scan showed intense tracer uptake in the left frontal lobe lesion with severe edema, which was consistent with recurrence. Our case underscores the role of ⁶⁸Ga PSMA 11 PET/CT imaging of suspected glioblastoma recurrence which is the initial step in GBM theranostics with PSMA.

Keywords: ⁶⁸Ga-PSMA, glioblastoma multiforme, PSMA recurrent glioblastoma

Introduction

A 57-year-old man diagnosed with left frontal lobe glioblastoma multiforme IDH wild-type grade IV was operated on in June 2023. He received concurrent chemoradiotherapy with Temozolomide and received 60 Gy in 20 fractions in August 2023. He then developed complaints of headaches 6 months postsurgery, and had recurrent disease on MRI. He was referred for positron emission tomography/computed tomography (PET/CT) with a theranostic intent.

Maximum intensity projection image of the whole body (A, green arrow) and brain (C) shows increased metabolism in the left frontal lobe. PET images (B) show hypermetabolism in the left frontal region. CT and ⁶⁸Ga PSMA 11 PET/CT scan (D and E, axial CT and fused PET/CT; F and G, coronal CT and fused PET/CT) shows intense tracer uptake along the periphery of an irregular hypodense lesion in the left frontal lobe [Figure 1]. MR images showed a heterogeneously hyper-intense area of altered signal intensity in the left frontal lobe, with a postcontrast study showing a peripheral patchy enhancement. Due to the absence of normal physiological ⁶⁸Ga PSMA 11 PET/CT uptake in the brain parenchyma, the lesion showed clear margins, which can be made out in ⁶⁸Ga PSMA 11 PET/CT images with SUV_{max} of 4.08.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-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

Discussion

Glioblastoma is the most common and most aggressive primary tumor of the brain with a poor prognosis and median survival of approximately 14–15 months from diagnosis with a high recurrence rate.^[1] Gadolinium-enhanced MRI is the imaging modality of choice for recurrence, but it's difficult to differentiate between radiation necrosis and recurrence. The prospective role of ⁶⁸Ga PSMA 11 PET/CT brain imaging in high-grade gliomas has been assessed in various studies and found to be very useful in the evaluation of glioma recurrence.^[2,3] Unlike 18F-FDG PET/CT, which has high physiological uptake in the brain parenchyma, ⁶⁸Ga PSMA 11 has no physiologic tracer uptake in the normal brain parenchyma, which helps in tumor delineation. From a theranostic perspective, the lesion uptake was equal to or slightly more than the liver.^[4] The findings of our case underscore the utility of ⁶⁸Ga PSMA 11 PET/CT imaging of suspected glioblastoma recurrence cases and for potential theranostic applications using alpha or beta emitters.^[5]

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/

How to cite this article: Vishnu AR, Damle NA, Haresh KP, Tripathi M, Priyanka GB. ⁶⁸Ga-PSMA PET/CT in a case of recurrent glioblastoma. Indian J Nucl Med 2025;40:115-6.

**Arunachalam
Raghupathi Vishnu,
Nishikant Avinash
Damle,
Kunhi Parambath
Haresh¹, Madhavi
Tripathi,
Priyanka GB**

Departments of Nuclear
Medicine and ¹Radiation
Oncology, All India Institute
of Medical Sciences,
New Delhi, India

Address for correspondence:
Dr. Nishikant Avinash Damle,
Department of Nuclear
Medicine, All India Institute
of Medical Sciences, Ansari
Nagar, New Delhi, India.
E-mail: nishikantavinash@
gmail.com

Received: 17-09-2024
Revised: 03-12-2024
Accepted: 03-12-2024
Published: 27-06-2025

Access this article online

Website: <https://journals.lww.com/ijnm>

DOI: 10.4103/ijnm.ijnm_126_24

Quick Response Code:



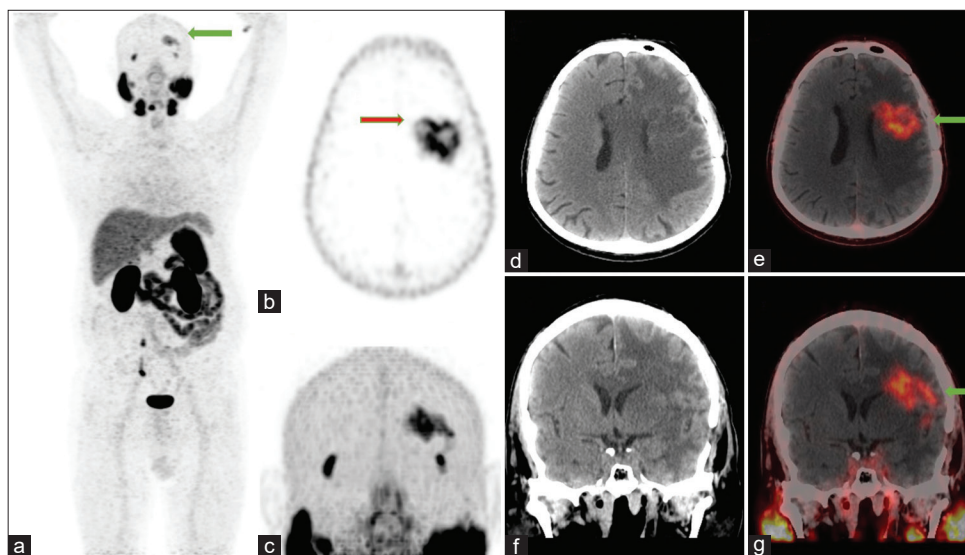


Figure 1: Maximum intensity projection image of the whole body ([a] green arrow) and brain (c) shows increased metabolism in the left frontal lobe. Positron emission tomography (PET) images [b – orange arrow] show hypermetabolism in the left frontal region. Computed tomography (CT) and ^{68}Ga PSMA 11 PET/ CT scan ([d and e], axial CT and fused PET/CT; [f and g – green arrow], coronal CT and fused PET/CT) shows intense tracer uptake along the periphery of an irregular hypodense lesion in the left frontal lobe

her/their images and other clinical information to be reported in the journal. The patients understand that their names 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.

References

1. Hanif F, Muzaffar K, Perveen K, Malhi SM, Simjee SH. Glioblastoma multiforme: A review of its epidemiology and pathogenesis through clinical presentation and treatment. *Asian Pac J Cancer Prev* 2017;18:3-9.
2. Sasikumar A, Kashyap R, Joy A, Charan Patro K, Bhattacharya P, Reddy Pilaka VK, *et al.* Utility of ^{68}Ga -PSMA-11 PET/CT in imaging of glioma-a pilot study. *Clin Nucl Med* 2018;43:e304-9.
3. Kumar A, ArunRaj ST, Bhullar K, Haresh KP, Gupta S, Ballal S, *et al.* Ga-68 PSMA PET/CT in recurrent high-grade gliomas: Evaluating PSMA expression *in vivo*. *Neuroradiology* 2022;64:969-79.
4. Kunikowska J, Charzyńska I, Kuliński R, Pawlak D, Maurin M, Królicki L. Tumor uptake in glioblastoma multiforme after IV injection of $[(177)\text{Lu}]$ Lu-PSMA-617. *Eur J Nucl Med Mol Imaging* 2020;47:1605-6.
5. Kumar A, Ballal S, Yadav MP, ArunRaj ST, Haresh KP, Gupta S, *et al.* ^{177}Lu - ^{68}Ga -PSMA theranostics in recurrent glioblastoma multiforme: Proof of concept. *Clin Nucl Med* 2020;45:e512-3.