

# New axillary lymph nodal F-18 fluoro-deoxy glucose uptake in an interim positron emission tomography scan – not always a sign of disease progression

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**ABSTRACT** Fluoro-deoxy glucose (FDG) is a non-specific tracer and may accumulate in non-malignant conditions causing potential pitfalls leading to false-positive interpretations of interim positron emission tomography scan. We report a case of a potential pitfall of false-positive axillary lymph nodal F-18 FDG uptake caused by injection extravasation.

**Keywords:** F-18 fluoro-deoxy glucose, PET/CT false-positive, axillary lymph node, pitfalls

## INTRODUCTION

Early response assessment to chemotherapy with F18-Fluoro-deoxy glucose positron emission tomography/computed tomography (F-18 FDG PET/CT) is gradually becoming a standard of practice in patients with lymphoma. However, FDG is a non-specific tracer and may accumulate in non-malignant conditions causing potential pitfalls leading to false-positive interpretations of interim PET scan, which may result in unnecessary invasive procedures like fine needle aspiration cytology (FNAC) or changes in chemotherapy regimens. Here we report a case of a potential pitfall of false-positive axillary lymph nodal F-18 FDG uptake caused by injection extravasation.

## CASE REPORT

A 38-year-old patient diagnosed with Anaplastic Lymphoma was referred for interim PET scan after four cycles of CHOP (cyclophosphamide, hydroxydaunorubicin, oncovin, prednisolone) chemotherapy. His baseline PET scan revealed stage IV disease with multiple lymph nodes involvement along with liver and marrow involvement [Figure 1a]. However, there was no axillary lymph nodal involvement on either side patient

was treated with CHOP chemotherapy and interim PET scan was performed after four cycles of chemotherapy for response assessment. Interim PET scan revealed a significant metabolic and anatomic response with decrease in FDG uptake to the level of background in previously involved lymph nodes, liver and bone marrow. However, intense FDG uptake was noted in right axillary lymph node [Figure 1b] raising the possibility of a progressive disease as an occurrence of a new lesion is considered to be progression according to EORTC (European Organisation for Research and Treatment of Cancer) or PERCIST (PET Response Criteria in Solid Tumors) criteria. However, as the axillary lymph nodes were not involved in baseline scan and in context of complete metabolic response (CMR) in all the previously involved sites, false-positive uptake was suspected. CT images also showed preserved hilum with fat in the suspicious lymph node increasing the probability of false-positive FDG uptake. A detailed retrospective analysis of clinical history to rule out any infectious/inflammatory pathology of the limb, including recent immunization and procedure of injection was made. After detailed history patient revealed that mild pain was experienced at the site of injection at the time of injection of the tracer and local examination of the catheter insertion site revealed mild swelling consistent with injection extravasation. So a presumptive diagnosis of false-positive axillary lymph nodal FDG uptake due to injection extravasation was made. For confirmation, patient was subjected to repeat PET/CT scan after 4 days with all the precautions and peripheral venous catheter insertion on the other side (left forearm). Repeat PET scan did not reveal any axillary lymph node F18-FDG uptake in either axillae [Figures 1c and d] confirming the suspicion of false-positive FDG uptake in right axillary lymph node due to injection extravasation. Once false-positive uptake was excluded,

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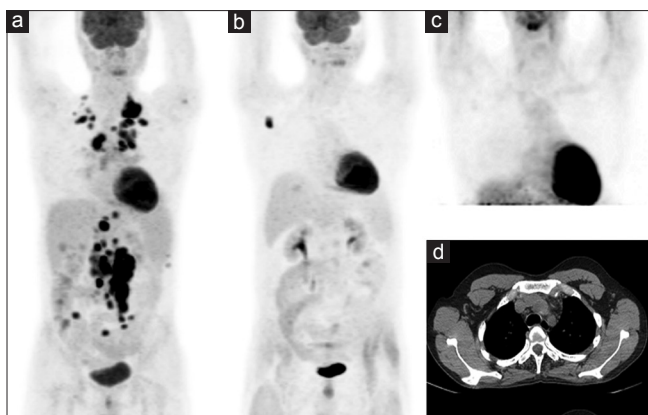
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**Figure 1:** F-18 Fluoro-deoxy glucose (FDG) positron emission tomography/computed tomography (PET/CT) images in a patient with lymphoma showing multiple lymph nodal involvement above and below the diaphragm and liver with no axillary lymph nodal involvement in pre therapy MIP. (a) the interim PET maximum intensity projection MIP image (b) shows complete metabolic response in previously involved lymph nodes and liver with new focus of uptake in right axilla. Repeat PET scan image (c) done after 4 days with proper precautions shows no abnormal FDG uptake in axilla and corresponding CT image (d) showing normal sized lymph node with preserved fatty hilum

an interpretation of CMR was made. Later, the patient underwent two more cycles of CHOP therapy and presently in complete remission clinically.

## DISCUSSION

F-18FDG PET/CT is increasingly used in oncology for response assessment to chemotherapy in a wide variety of malignant tumors.<sup>[1,2]</sup> Of all the malignancies lymphoma is one disease in which role of F-18 FDG PET/CT has been used most extensively in staging, response assessment and restaging.<sup>[3]</sup> Robust clinical data exist supporting the role of interim F-18 FDG PET/CT scan in lymphoma especially in Hodgkin's lymphoma.<sup>[4]</sup> Suspicion of false-positive FDG uptake due to inflammatory process requires pathological confirmation before management changes based on interim PET scan.<sup>[5]</sup> This potential limitation is due to the non-specificity of FDG tracer, whose uptake reflects only increased glucose metabolism, which is not the property of only tumor cells. False-positive uptake can be noted in any tissue with increased metabolism as in case of inflammatory and granulomatous pathologies.<sup>[6]</sup> One study by Karam, *et al*,<sup>[7]</sup> also reported that around 50% of bilateral hilar lymph nodal FDG uptake in patients with lymphoma is due to inflammatory/granulomatous pathology. Apart from this potential limitation of non-specific uptake false-positive FDG uptake has also been reported in axillary lymph nodes following immunization,<sup>[8,9]</sup> infectious/inflammatory pathologies<sup>[10]</sup> and rarely due to injection extravasation. Axillary lymph nodal FDG uptake in case of extravasation is related to lymphatic drainage from soft tissues of upper limb into axillary lymph nodes from the site of extravasation. As appearance of a new lesion during the course

of chemotherapy is considered a progressive disease according to either PERCIST or EORTC criteria, this non-specific uptake can lead to change in outlook and management of the patient warranting FNAC examination of the suspicious lymph nodes. Keeping this in mind great caution should be exercised when judging a new lesion with-FDG uptake as a sign of progressive disease. Detailed clinical history, comparison with baseline scan and also CT component of PET/CT scan are very useful in avoiding this false-positive interpretation. In our case though intense FDG uptake was noted in the right axillary lymph node, fatty hilum was preserved in the lymph node on CT images. This can be a very useful sign as preservation of fatty hilum is deemed to be highly specific and has high negative predictive value in ruling out malignant involvement of lymph nodes.<sup>[11]</sup> In our case, accurate identification of this pitfall led to accurate interpretation of the scan and thereby avoiding unnecessary cytological examinations of the suspicious lymph node.

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