Case Report

Journal of Arthritis and Rheumatology

# A Case Report of glucose metabolism Lymph node involvement on PET CT in a Systematic Form of Lupus Erythematosus

**Anna GiRenzol and Soma Yimlin**

*Johns Hopkins Division of Rheumatology, Baltimore*

***Corresponding Author :** Anna GiRenzo1, Johns Hopkins Division of Rheumatology, Baltimore.

**Received :** September 25, 2023
**Accepted:** September 26, 2023
**Published :** October 26, 2023

## ABSTRACT

**Background :** Diffuse lymphadenopathy is rarely linked to active, new-onset Systemic Lupus Erythematosus (SLE). This is particularly concerning in cases of malignancy, where a neoplastic workup usually includes F18/FDG PET scanning. The results are frequently difficult to interpret and frequently show similarities to lymphoma. In this context, the literature describing systematic differences between neoplasm and inflammation related to SLE is scarce.

**Case Series :** In the context of active SLE, we have examined the histology and F18/FDG PET/CT imaging from three patients with hypermetabolic lymph nodes who were found to have benign pathology.

**Conclusion :** Rarely, rheumatic diseases can be evaluated for inflammation non-invasively using FDG PET scanning, one type of imaging modality. To differentiate benign inflammation from neoplasm using standard uptake units, more research is required. Nonetheless, in this specific patient population, lymph node biopsy ought to continue to be the gold standard for diagnosis.

**Keywords :** *PET scan; Systemic Lupus Erythematosus; Lymphadenopathy;*

## INTRODUCTION

An autoimmune condition known as systemic lupus erythematosus (SLE) affects several organ systems and manifests itself in a variety of ways, sometimes with a sudden onset [1]. It might be connected to lymphadenopathy, particularly when there is a lot of disease activity [2]. It can be challenging to distinguish between SLE with lymphadenopathy and malignancies like lymphoma [3]. Concerningly, there is also a higher risk of non-Hodgkin's lymphoma in SLE patients, which could be related to immunosuppressive drugs in contrast to high disease activity [4], [5]. Non-Hodgkin's lymphoma development had a pooled Relative Risk (RR) of 5.40 (95% CI, 3.75-7.77) in a recent meta-analysis of cancer risk in patients with SLE [6].

As part of the cancer staging process, PET scanning can be helpful in identifying distant metastases, and as a result, it may also be helpful in identifying inflammatory areas [7]. It has previously been reported that in cases with SLE, PET scanning can qualitatively characterise the extent of systemic inflammation and organ involvement [8]. Mechanistically, activated cells concentrate in lymphoid organs and show increased levels of glucose metabolism, as demonstrated by a PET scan using a radioactively labelled tracer [9].

Three newly diagnosed SLE cases with highly metabolic lymphadenopathy on PET scans that showed benign biopsy results have been evaluated. Concerning malignancy in the context of diffuse lymphadenopathy, PET scans were performed.

Despite the negative biopsy results, all three PET scans caused the doctors and patients great anxiety. There are currently very few studies evaluating the use of PET scans to characterise inflammation and disease activity in patients with SLE, and the findings may cause difficulties with diagnosis. We contend that the most reliable method of diagnosis for individuals with bulky lymphadenopathy should continue to be lymph node biopsy.

### Case 1

Over the course of several weeks, a 33-year-old woman experienced weight loss, tachycardia, pleuritic chest pain, and fevers that got worse. Despite multiple negative imaging results for pulmonary embolism, her chest CT scans revealed diffuse lymphadenopathy. During her physical examination, she had noticeably enlarged cervical and axillary lymph nodes, which raised concerns about cancer. Her rheumatology clinic was consulted after she also experienced arthralgias. There, it was discovered that she was leukopenic, with positive anti-nuclear

antibodies (>1:640, homogeneous pattern), anti-dsDNA antibodies (1:320), anti-Ro, anti-La, anti-RNP, and anti-Smith antibodies; additionally, she had low C3 of 60 mg/dL (normal 79-152 mg/dL) and low C4 of <2 mg/dL. Her ratio of creatinine to urine protein was higher than normal, at 0.28 (normal: 0.00–0.19).

Following her F18/FDG PET/CT scan, hypermetabolism was found in her cervical, axillary, mediastinal, retroperitoneal, and Figure 1 shows that involvement of the spleen and bone marrow along with iliac and inguinal lymph nodes is also problematic for lymphoma. Her SUVmax measured 4.6. Reactive lymphoid tissue was the only thing found when a right axillary lymph node was aspirated with a tiny needle. She got a full excisional right axillary lymph node biopsy because the risk of lymphoma was so great; the results were consistent with benign dermatopathic lymphadenopathy.

**Case 2**

A 38-year-old woman was admitted to a sizable tertiary care facility with pancytopenia, diffuse lymphadenopathy, and a 20-pound weight loss spread over several weeks. She had a documented medical history of overlap pauci-immune glomerulonephritis and systemic lupus erythematosus. Twelve years before this presentation, her lupus was diagnosed. It was characterised by anti-nuclear antibodies (1:160), anti-dsDNA antibodies (1:640), pancytopenia, photosensitivity, arthritis, and hypocomplementemia (nadir C3 52 mg/dL, normal 79-152 mg/dL; C4 mg/dL, normal 12-42 mg/dL).

She also had a steadily worsening cough and shortness of breath. She had periportal, peripancreatic, retroperitoneal, axillary, and supraclavicular lymphadenopathy discovered by CT imaging of her chest, abdomen, and pelvis. The results of an F18/FDG PET/CT scan showed diffuse, highly metabolic lymphadenopathy. 13.2 SUVmax was measured in one hyperintense subcarinal lymph node. Nevertheless, a supraclavicular excisional lymph node biopsy revealed coagulative necrosis and histiocytic lymphoproliferation, both of which were indicative of lupus lymphadenitis.

**Case 3**

Over the course of several months, a 25-year-old woman experienced severe arthritis, recurrent pleurisy, and axillary and cervical lymphadenopathy. Her immunologic studies revealed significant levels of anti-nuclear antibodies (>1:640), anti-Smith antibodies, anti-dsDNA (1:20), anti-SSA, and anti-SSB antibodies. She was referred to our rheumatology clinic. Her complements were low; her C3 was 58 mg/dL (normal range: 79–152 mg/dL) and her C4 was 3 mg/dL (normal range: 12-42 mg/dL). After that, she received an SLE diagnosis. Further imaging was obtained because there was concern for a neoplastic process due to the persistent axillary lymphadenopathy over serial examinations. Her axillary lymph nodes had isolated hypermetabolic activity, according to an F18/FDG PET CT scan. SUVmax was reported to be 4.1. After a right axillary node aspiration with a tiny needle, reactive lymphoid tissue with follicular and paracortical hyperplasia was discovered.

## Discussion

In the framework of SLE, each of these cases shows the emergence of bulky lymphadenopathy, raising concerns about lymphoma. On PET scanning, hypermetabolic lymph nodes were seen in all three of these cases, but they did not have similar characteristics or intensities. PET scanning lacks the precision necessary to distinguish between inflammation and malignancy, despite the possibility that it could be used as a non-invasive modality in this regard. We contend that in patients with lupus, a group more susceptible to lymphoma, biopsy ought to continue to be the gold standard for evaluating lymphadenopathy. In other entities, PET scanning may be utilised to distinguish between inflammation and malignancy; however, the literature currently available only includes case reports regarding SLE. A retrospective analysis of 32 Sjogren's Syndrome patients revealed that 4 of them had lymphoma; these patients' imaging showed a comparatively higher SUVmax (standard uptake unit) than those of patients who had reactive lymphadenopathy alone (5.4 vs. 3.2 SUVmax, p=0.05). According to a study examining 48 patients with Fever of Unknown Origin (FUO), the mean SUV for tumours was 10.4 (range 7.2–15.3), while the mean SUV for inflammation was 3.8 (range 3.2–5.6) [10]. On the other hand, we observed that the SUVmax in Case 2, which was biopsied as benign lupus lymphadenitis, was 13.2. Significantly, SUV measurements and exacting quality standards are strongly influenced by the PET scanner and reconstruction techniques. When comparing research, control measures are required [11]. Bone marrow infiltration is another high-risk characteristic related to lymphoma that is observed on PET scans. The requirement for a bone marrow biopsy to determine bone marrow involvement in patients with newly diagnosed diffuse large B-cell lymphoma was eliminated in a meta-analysis of those individuals when positive FDG PET/CT results of bone marrow involvement were found [12].

## Conclusion

Larger-scale, highly powered studies are also required to improve measurement definitions and make it easier to distinguish between inflammation and malignancy on PET scans. Although in theory this would help to avoid invasive surgical procedures, lymph node biopsy should still be the gold standard for diagnosis in these high-risk patients. These examples highlight the significant and somewhat unpredictable burden of inflammation in the development of SLE..

## References

1. Soediono B. Systemic Lupus Erythematosus. J Chem Inf Model. 1989;53:160.

2. Shapira Y, Weinberger A, and Wysenbeek AJ. Lymphadenopathy in systemic lupus erythematosus. Prevalence and relation to disease manifestations. Clin Rheumatol.1996;15(4):335–338.

3. Melikoglu MA and Melikoglu M. LAP as a Manifestation of SLE. Acta Reum Port. 2008;33:402–406.

4. Bernatsky S, Ramsey-Goldman R, Joseph L, Boivin JF, Costenbader, Urowitz MB, et al. Lymphoma risk in systemic lupus: effects of disease activity versus treatment." Ann Rheum Dis. 2014;73(1):138–142.

5. Bichile T and Petri T. Incidence of lymphoma associated with underlying lupus: lessons learned from observational studies. Curr Opin Rheumatol. 2014;26:111–117, 2014.

6. Cao L, Tong H, Xu H, Liu H, Meng H, Wang J, et al. Systemic lupus erythematous and malignancy risk: A meta-analysis. PLoS One. 2015;10(4):1–21. doi: 10.1371/journal.pone.0122964.

7. Yamashita H, Kubota K. Mimori A. Clinical value of whole-body PET/CT in patients with active rheumatic diseases. Arthritis Res Ther. 2014;16(5):423.

8. Curiel R, Akin EA, Beaulieu G, Depalma L, Hashefi M. PET/CT imaging in systemic lupus erythematosus. Ann N Y Acad Sci. 2011;1228(1):71–80. doi: 10.1111/j.1749-6632.2011.06076.x.

9. Nowak M, Carrasquillo a J, Yarboro CH, Bacharach SL, Whatley , Valencia X, et al. A pilot study of the use of 2-[18F]-fluoro-2-deoxy-D-glucose-positron emission tomography to assess the distribution of activated lymphocytes in patients with systemic lupus erythematosus. Arthritis Rheum. 2004;50(4):1233–1238.

10. Ferda J, Ferdová E, Záhlavav J, Matějovič M, Kreuzberg B. Fever of unknown origin: A value of 18F-FDG-PET/CT with integrated full diagnostic isotropic CT imaging. Eur J Radiol. 2010;73(3):518–525. doi: 10.1016/j.ejrad.2008.12.014.

11. Adams MC, Turkington TG, Wilson JM, and Wong TG. A systematic review of the factors affecting accuracy of SUV measurements. Am J Roentgenol. 2010;195(2):310–320. doi: 10.2214/AJR.10.4923.

12. Adams HJA, TC Kwee, De Keizer B, Fijnheer R, De Klerk JMH, Nievelstein RAJ. FDG PET/CT for the detection of bone marrow involvement in diffuse large B-cell lymphoma: Systematic review and meta-analysis.