

**FDG Avid Axillary Lymph Nodes After COVID-19 Vaccination**

B. Jake Johnson, MD<sup>1</sup>, Kathryn M. Van Abel, MD<sup>1</sup>, Daniel J. Ma, MD<sup>2</sup>, Derek R. Johnson, MD<sup>3</sup>

Mayo Clinic Department of Otorhinolaryngology<sup>1</sup>, Mayo Clinic Department of Radiation

Oncology<sup>2</sup>, Mayo Clinic Department of Radiology<sup>3</sup>

Mayo Clinic, Rochester, MN, United States of America

Key words: COVID-19 Vaccine, PET/CT, FDG avid lymphadenopathy

No conflicts of interest for any of the authors.

Corresponding Author:

B. Jake Johnson

200 First St SW, Rochester, MN 55905

507-284-1482

johnson.brian@mayo.edu

Dear Editor,

In a recent patient with a left-side parotid malignancy (biopsy proven mammary analogue secretory carcinoma), FDG F-18 PET/CT was obtained during the workup. This showed FDG avidity in left axillary lymph nodes with overall SUV max 4.5, and a FDG avid left supraclavicular lymph node. This prompted an ultrasound guided biopsy of the lymph nodes prior to surgery. Pathology for both subsites revealed lymphocytes consistent with a benign lymph node. Around the time of the biopsy, the patient recalled that she had received the first dose of the ModernaTX, Inc, mRNA-1273 vaccine 10 days prior in her left deltoid. After vaccination, she had



injection site soreness, and some mild fatigue and general malaise for about 4 hours. She then underwent successful superficial parotidectomy, with margin-negative and node-negative resection of the left parotid mammary analogue secretory carcinoma.

Shortly after the aforementioned patient, 3 month post-treatment PET imaging was obtained as part of oncologic surveillance for a patient with history of oral cavity/oropharyngeal squamous cell carcinoma. On physical exam 3 days before to her PET, laryngoscopy revealed findings concerning for recurrence in the previous surgical bed. The bilateral necks were palpated, with no lymphadenopathy appreciated. On PET, left axillary and left supraclavicular nodes had FDG-avidity, with SUV max of 5.1. Due to our previous experience as above, the patient was

questioned specifically regarding COVID-19 vaccination. She was able to recall that she had received the first dose of the COVID-19 vaccine 14 days prior, though she could not recall the manufacturer. The patient reported minimal symptoms after vaccination and was asymptomatic at the time of the PET scan. She was taken to the OR for direct laryngoscopy, and biopsy of the concerning area revealed mild dysplasia with no evidence of carcinoma.

Fludeoxyglucose (FDG) uptake is not tumor-specific and can be seen in infection, inflammation, and granulomatous disease<sup>1</sup>. Axillary lymph node FDG avidity has been reported in patients receiving several types of vaccines, including vaccinations to influenza, H1N1, and the human papillomavirus vaccine, but has not been reported in association with the COVID-19 vaccine<sup>2-4</sup>. Ultrasound-guided FNA is generally a low morbidity procedure, though no procedure is without risk. Biopsy of her axillary node could have likely been avoided if the recent history of vaccination was correlated with her left axillary FDG avid lymph nodes. Limited data on mammary analogue secretory shows 5.5% rate of cervical nodal metastasis, but biopsy of a supraclavicular node with FDG uptake is prudent in the setting of an ipsilateral parotid malignancy<sup>5</sup>. Our second pat

As vaccination against the 2019 novel coronavirus becomes more widespread, it will be important to consider vaccination history, especially in patients who undergo FDG F-18 PET/CT for cancer staging or surveillance. Reporting vaccine history and injection location prior to obtaining PET imaging may help with interpretation these studies. Further study could reveal what percentage of patients have FDG-avid lymph nodes after vaccination and elucidate time required after vaccination to allow for resolution of uptake in regional lymph nodes. This information may be able to guide recommendations regarding timing of PET imaging and COVID-19 vaccination.

## References

1. Rahman WT, Wale DJ, Viglianti BL, et al. The impact of infection and inflammation in oncologic (18)F-FDG PET/CT imaging. *Biomed Pharmacother.* 2019;117:109168.
2. Focosi D, Caracciolo F, Galimberti S, Papineschi F, Petrini M. False positive PET scanning caused by inactivated influenza virus vaccination during complete remission from anaplastic T-cell lymphoma. *Ann Hematol.* 2008;87(4):343-344.
3. Iyengar S, Chin B, Margolick JB, Sabundayo BP, Schwartz DH. Anatomical loci of HIV-associated immune activation and association with viraemia. *Lancet.* 2003;362(9388):945-950.
4. Panagiotidis E, Exarhos D, Housianakou I, Bournazos A, Datseris I. FDG uptake in axillary lymph nodes after vaccination against pandemic (H1N1). *Eur Radiol.* 2010;20(5):1251-1253.
5. Anderson JL, Haidar YM, Armstrong WB, Tjoa T. Analysis of Clinical Features of Mammary Analog Secretory Carcinoma Using the Surveillance, Epidemiology, and End Results Database. *JAMA Otolaryngol Head Neck Surg.* 2019;145(1):91-93.