

INTRODUCTION

Ipsilateral lymph node activity has been observed on [18F]FDG PET following intramuscular vaccines, more recently with COVID-19 vaccines. Interpretation of imaging findings can become problematic in an oncological context, as lymph node uptake can overlap between reactive and pathologic lymphadenopathy. This can sometimes have an impact on subsequent clinical management of the patient, prompting additional workup and delaying cancer care. Although a few studies have described lymph node uptake on [18F]FDG PET following COVID-19 vaccination, the literature remains limited, especially for other PET tracers.

OBJECTIVES

The aim of this study was to characterize axillary lymph node uptake on PET after COVID-19 vaccination and to assess the impact on clinical management of oncology patients.

TABLE 1. Characteristics of study population

Male/female, n (%)	241 (43%) / 318(57%)
Age, years	64 (19 – 92)
PET tracer :	N = 559
[18F]FDG	500
[18F]PSMA	32
[68Ga]DOTATATE	27
Type of vaccine :	
Pfizer	411
Moderna	116
Astrazeneca	32
Number of COVID-19 vaccine doses :	
1 dose	272
2 doses	280
3 doses	7
Time interval between vaccination and PET/CT (days)	36 (1 – 249)
Type of primary cancer	
Lung	124 (22%)
Colorectal	40 (7%)
Breast	100 (18%)
Lymphoma	55 (10%)
Gastro-esophageal	24 (4%)
Prostate	36 (7%)
Other urologic cancers	13 (2%)
Head and neck	31 (6%)
Melanoma et other skin cancers	38 (7%)
Pancreas	6 (1%)
Gynecologic	40 (7%)
Thyroid	7 (1%)
Pancreatic neuroendocrine tumors	9 (2%)
Gastrointestinal neuroendocrine tumors	13 (2%)
Others	23 (4%)

METHODS

We evaluated retrospective data from patients who had received at least one dose of COVID-19 vaccine and who underwent [18F]FDG, [18F]PSMA or [68Ga]DOTATATE PET for oncological indication between May 2021 and May 2022 at the Centre Hospitalier de l'Université de Montréal. Axillary lymph node uptake on PET was measured by SUVmax and confirmed by visual assessment. The impact on clinical management was carried out by a review of patient files.

RESULTS

A total of 559 PET scans were analyzed. 33% (163/500) of patients who underwent [18F]FDG PET had significant ipsilateral axillary lymph node uptake (mean SUVmax 3.3), compared to 37% (10/27) with [68Ga]DOTATATE (mean SUVmax 2.2) and 19% (6/32) with [18F]PSMA (mean SUVmax 1.2). On [18F]FDG PET, 13% (21/163) required additional workup to clarify the nature of the lymph node uptake (11 biopsies, 10 imaging modalities), in most cases for breast cancer (14/21). Of the 21 patients who required additional investigations, 16 had results available on file review, and only 3 of them revealed metastasis. No further workup was required for [18F]PSMA or for [68Ga]DOTATATE. Although there was a trend towards an inverse correlation between axillary lymph node SUVmax and time since last vaccine dose for [18F]FDG, the results were not statistically significant for the whole cohort ($p = 0.28$, Figure 1). However, when restricting analysis to a time interval between 48h and 60 days post vaccine, the results were statistically significant ($p = -0.17$, $p = 0.04$). An ANOVA test did not show any significant impact of the number of vaccine doses ($p = 0.50$) and the type of vaccine ($p = 0.79$) on SUVmax. A chi-square test did not demonstrate a significant impact of the number of doses ($p = 0.96$) or the type of vaccine ($p = 0.24$) on the frequency of axillary lymph node uptake.

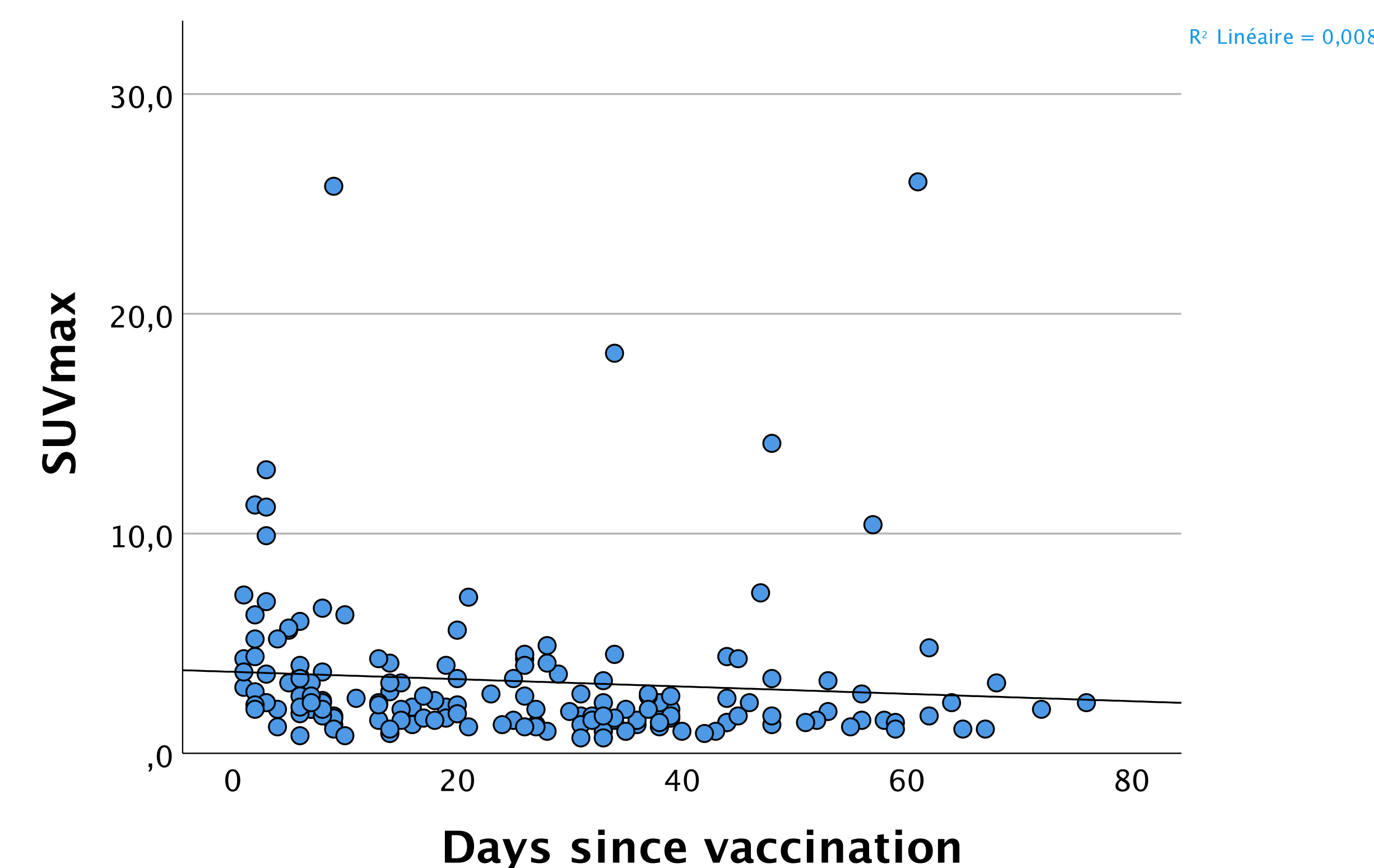


FIGURE 1. SUVmax of ipsilateral axillary lymph node on [18F]FDG PET plotted against number of days since last COVID-19 vaccine.

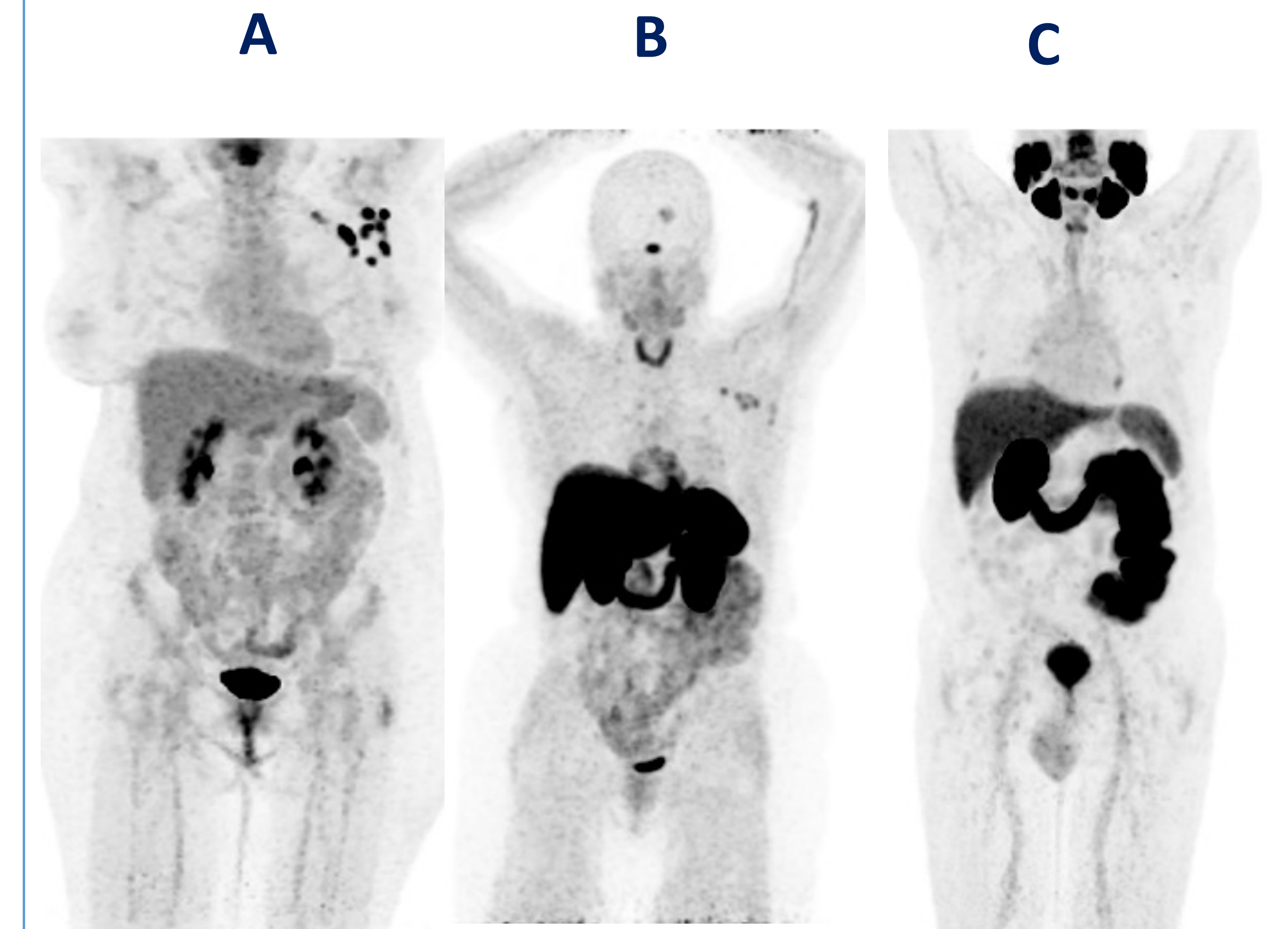


FIGURE 2. PET/CT images of reactive ipsilateral axillary lymphadenopathy on A) [18F]FDG PET, B) [68Ga]DOTATATE and C) [18F]PSMA following COVID-19 vaccination

CONCLUSION

Ipsilateral axillary lymph node uptake can frequently be observed on [18F]FDG, [18F]PSMA and [68Ga]DOTATATE PET following COVID-19 vaccination. However, few cases require additional workup to distinguish a benign inflammatory reaction from malignancy. In conclusion, COVID-19 vaccination is not a limiting factor in the interpretation of PET in an oncological context.

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