



Subcutaneous Uptake on [¹⁸F]Florbetaben PET/CT: a Case Report of Possible Amyloid-Beta Immune-Reactivity After COVID-19 Vaccination

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Abstract

Introduction Large-scale worldwide COVID-19 vaccination programs are being rapidly deployed, and high-risk patients with comorbidity are now receiving the first doses of the vaccine. Physicians should be, therefore, aware of new pitfalls associated with the current pandemic vaccination program, also in the case of [¹⁸F]Florbetaben PET/CT.

Case Presentation

We described the first image of [¹⁸F]Florbetaben PET/CT in the evaluation of a 70-year-old male with suspicious Alzheimer disease and unclear history of heart disease. We detailed the diagnostic imaging PET/CT workup with different findings.

Conclusion In this case, [¹⁸F]Florbetaben PET/CT can demonstrate potential beta-amyloid immune-reactivity and deposition associated with the current COVID-19 pandemic vaccination programs.

Keywords COVID-19 · Amyloid · PET/CT · Alzheimer · Florbetaben · Vaccination

Introduction

Large-scale worldwide COVID-19 vaccination programs are being rapidly deployed, and high-risk patients with comorbidity are now receiving the first doses of the vaccine. Physicians should be, therefore, aware of new pitfalls associated

with the current pandemic vaccination program, also in the case of [¹⁸F]Florbetaben PET/CT.

Case Presentation

We report the case of a 70-year-old male who underwent [¹⁸F]Florbetaben PET/CT for suspected Alzheimer disease (AD) 1 day after the administration of the first dose of Pfizer-BioNTech COVID-19 vaccine in the right arm in absence of any related symptoms. The patient was also referred with a concomitant unclear history of heart disease (hypertensive disease and initial signs of heart failure with suspicious of cardiac amyloidosis), and therefore, the thorax was also included in the acquisition's field due to [¹⁸F]Florbetaben PET potential utility in the diagnostic workup of cardiac amyloidosis [1, 2]. A moderate amyloid burden on the bilateral frontal and parietal brain cortex in the absence of cardiac beta-amyloid deposition was identified, referable to as the presence/development of AD. However, subcutaneous uptake on the vaccination site in the right arm's deltoid region and focal uptake next to an ipsilateral axillary lymph node were noted. Tracer injection was via the left

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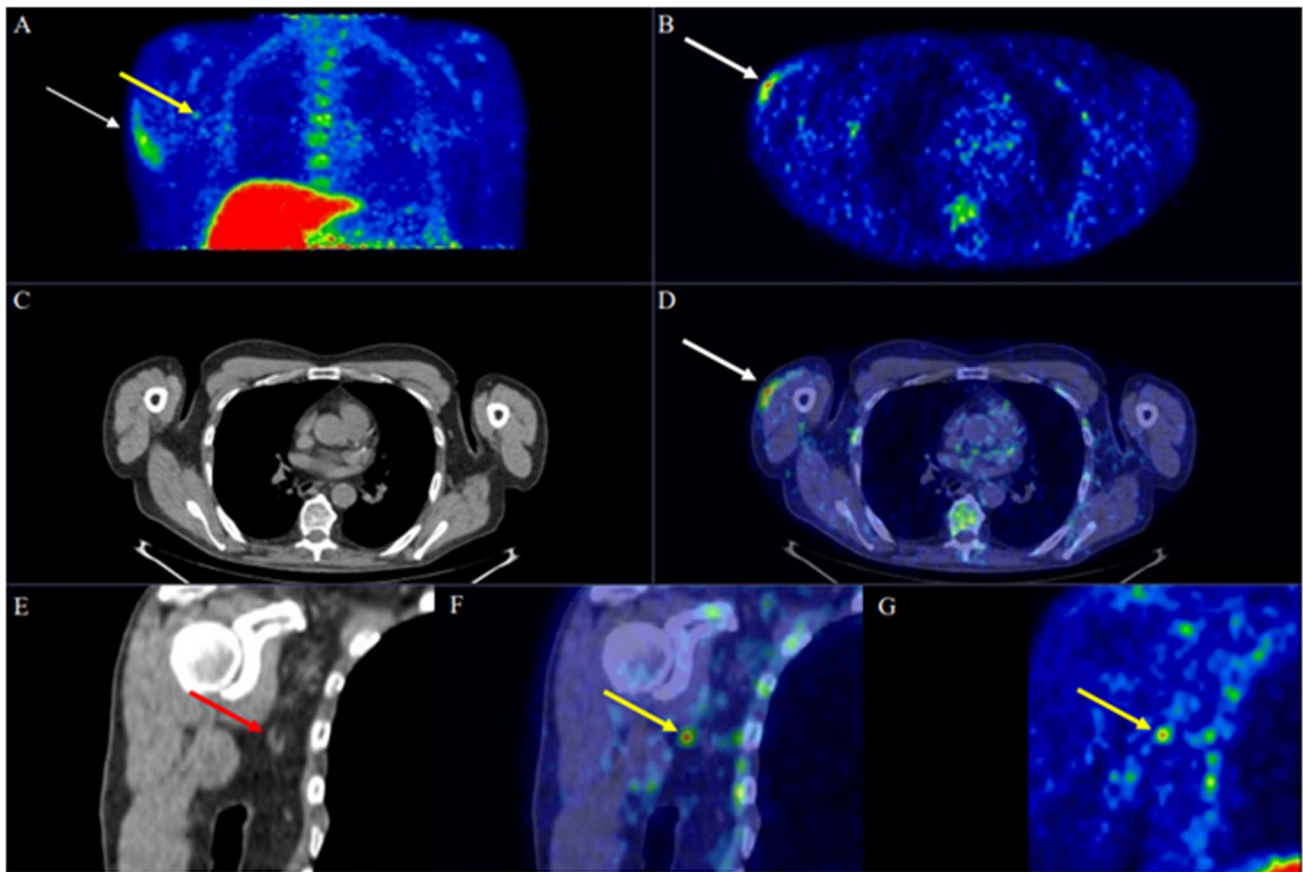


Fig. 1 [^{18}F]Florbetaben PET/CT: MIP (A), PET (axial-B, coronal-G), CT (axial-C, coronal-E), PET/CT (axial-D, coronal-F) images demonstrated ill-defined uptake in the right arm's subcutaneous tissues (SUVmax 5.6; **white-arrows**) and next to a possible right-axillar

lymph node (SUVmax 4.75; **yellow-arrows**) evident on low-dose CT scan without breathing control (**red arrows**). Reprinted with permission from Nuclear Medicine Unit, Fondazione Istituto G. Giglio, Cefalù (Palermo), Italy.

antecubital fossa, hence not a potential cause. In Fig. 1, [^{18}F]Florbetaben MIP (A), PET (axial-B, coronal-G), CT (axial-C, coronal-E), PET/CT (axial-D, coronal-F) images demonstrated ill-defined uptake in the right arm's subcutaneous tissues (SUVmax 5.6; white-arrows) and next to a possible right-axillar lymph node (SUVmax 4.75; yellow-arrows) evident on low-dose CT scan without breathing control (red arrows). We assume that the subcutaneous and the potential lymph node uptake might be related to an induced inflammation with peptides deposition, as amyloid-beta peptides are involved in the systemic inflammatory process such as in the physiopathology of AD, and chronic, low-level systemic inflammation may exacerbate the A β deposition [3–6]. Such induced inflammation, already demonstrated with several tracers [7–9], may be further enhanced in AD patients by the amyloid-beta presence. In this sense, Hsu et al. observed in a preclinical study that the intracellular immunoreactivity was significantly increased by the SARS-CoV-2 pseudovirus in the presence of A β_{1-42} (a strong indicator of AD with high affinity for SARS-CoV-2 spike protein S1 subunit) compared

to SARS-CoV-2 pseudovirus alone. Interestingly, they also observed that A β_{1-42} significantly increased SARS-CoV-2 infectivity and that the clearance of A β_{1-42} can be reduced during SARS-CoV-2 infection [10]. Similar findings with other radiopharmaceuticals were recently described [7–9], but this is the first case to show that also [^{18}F]Florbetaben PET/CT can demonstrate immune-induced findings, also amplified by the beta-amyloid presence, associated with the current COVID-19 pandemic vaccination programs, being a potential finding on whole-body protocols for the assessment of cardiac/systemic amyloidosis.

Conclusion

[^{18}F]Florbetaben PET/CT can demonstrate immune-induced findings, also amplified by the beta-amyloid presence, associated with the current COVID-19 pandemic vaccination programs.

Author Contribution RL, PA: conceptualization and original draft writing; GLME: conceptualization; IAB, FM, SB: review and editing; SS, FP, CL: data curation.

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Data Availability Data are available for bona fide researchers who request it from the authors.

Declarations

Ethics Approval and Informed Consent All procedures performed involving the human participant were under the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from the patient.

Consent to Participate Informed consent was obtained from the patient.

Consent for Publication The consent for publication was obtained from the patient.

Competing Interests The authors declare no competing interests.

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