

Effect of COVID-19 on ^{18}F -FDG PET/CT: Is There a Need to Consider COVID-19 Status Before Planning ^{18}F -FDG PET/CT for Oncologic Evaluation?

Anwin Joseph Kavanal¹, Santosh Ranjan Jena¹, Rajender Kumar¹, Chandan Krushna Das², Sunil Kumar¹, and Bhagwant Rai Mittal¹

¹Department of Nuclear Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh, India; and ²Medical Oncology OPD, Department of Radiotherapy, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Incidental detection of coronavirus disease 2019 (COVID-19)-related lung changes on ^{18}F -FDG PET/CT images of oncology patients has been increasingly reported. Most of the case reports or series have stressed the retrospective diagnosis of COVID-19 with the help of ^{18}F -FDG PET/CT lung findings. In this case report, we introduce a different aspect of COVID-19-related lung changes on ^{18}F -FDG PET/CT, interfering with the evaluation of metastatic lung lesions in a patient with renal cell carcinoma.

Key Words: COVID-19; ^{18}F -FDG PET/CT; lung metastasis; response evaluation; renal cell carcinoma

J Nucl Med Technol 2021; 49:284–285

DOI: 10.2967/jnmt.121.262145

Various lung involvement patterns have been reported on ^{18}F -FDG PET/CT scans of coronavirus disease 2019 (COVID-19) patients undergoing workup for various malignancies. The patterns range from ^{18}F -FDG-avid diffuse ground-glass opacities to ^{18}F -FDG-avid patchy consolidatory changes, with or without ^{18}F -FDG-avid mediastinal lymph nodes, depending on the imaging time from the onset of infection and other unknown factors (1–4). COVID-19 infection was a retrospective diagnosis in most reported cases, after the typical findings were seen on the ^{18}F -FDG PET/CT images (3–7). Here, we present a different aspect of COVID-19 on ^{18}F -FDG PET/CT, in which there was interference with response assessment in a patient receiving chemotherapy for pulmonary metastasis from renal cell carcinoma.

CASE REPORT

A 45 y-old man with a known case of metastatic renal cell carcinoma underwent cytoreduction nephrectomy followed by first-line chemotherapy with pembrolizumab and axitinib because of multiple cannonball metastases in the lungs. ^{18}F -FDG PET/CT at the end of treatment showed disease progression in the form of an increase in the number and size of lung nodules. The patient was then started on second-line chemotherapy with oral lenvatinib (18 mg daily) and everolimus (5 mg daily). His interim ^{18}F -FDG PET/CT scan (Fig. 1) showed a favorable response (>30% reduction in size and ^{18}F -FDG avidity compared with baseline PET/CT) to second-line therapy, and he was continued on the same treatment. He was diagnosed with COVID-19 in May 2020 on evaluation for malaise and chills. He was managed conservatively with antibiotics, antipyretics, and multivitamins in a local hospital. He had no symptoms or signs suggestive of pneumonia and never required oxygen support during the 11-d course in the hospital. He was discharged from the hospital after a negative nucleic acid test 1 wk before

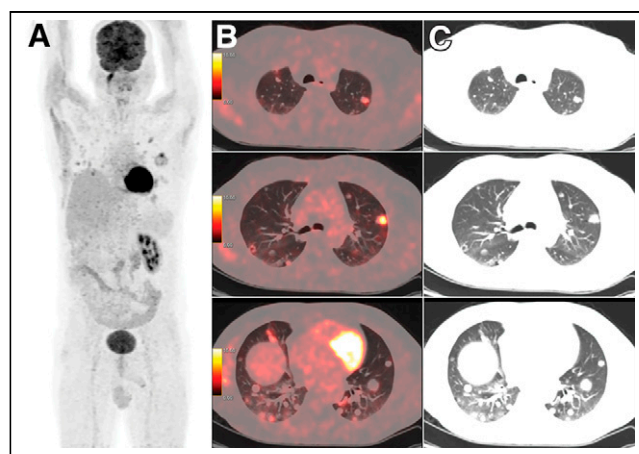


FIGURE 1. ^{18}F -FDG PET/CT whole-body maximum-intensity-projection image (A), axial PET/CT images (B), and corresponding CT images (C) showing variably ^{18}F -FDG-avid random nodules in both lung fields (SUV_{max} of hottest nodule, 9.9).

Received Feb. 16, 2021; revision accepted Mar. 26, 2021.

For correspondence or reprints, contact Bhagwant Rai Mittal (brmittal@yahoo.com).

Published online July 9, 2021.

Immediate Open Access: Creative Commons Attribution 4.0 International License (CC BY) allows users to share and adapt with attribution, excluding materials credited to previous publications. License: <https://creativecommons.org/licenses/by/4.0/>. Details: <http://jnmsnmjournals.org/site/misc/permission.xhtml>.

COPYRIGHT © 2021 by the Society of Nuclear Medicine and Molecular Imaging.

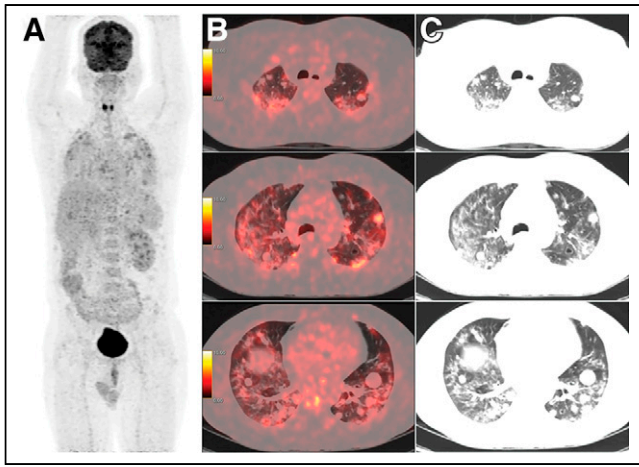


FIGURE 2. ^{18}F -FDG PET/CT whole-body maximum-intensity-projection image (A), axial PET/CT images (B), and corresponding CT images (C) showing ^{18}F -FDG-avid diffuse ground-glass opacities/patchy consolidatory changes bilaterally in lung fields from apex to base, obscuring details of metastatic lesions (SUV_{max} of hottest nodule, 7.8; SUV_{max} of ground-glass opacities, 7.3).

he was scheduled for an ^{18}F -FDG PET/CT scan at 6 mo of chemotherapy to determine the response. The ^{18}F -FDG PET/CT scan (Fig. 2) showed ^{18}F -FDG-avid diffuse ground-glass opacities/patchy consolidatory changes bilaterally in the lung fields from apex to base, obscuring the metastatic lesions. The COVID-19-related lung changes obscured both the anatomic and the metabolic features of the metastatic lesions, leading to difficulty in assessing the response to treatment.

DISCUSSION

^{18}F -FDG uptake in ground-glass opacities in the background may add spill-in counts to metastatic lesions, causing a falsely

high uptake in metastatic lesions (8). For this reason, an accurate assessment of the metabolic response was not possible in this patient. The patient was advised to repeat the nucleic acid test because of ^{18}F -FDG avidity in the ground-glass opacities/consolidatory changes and was found to be positive. The patient was then advised to remain home in isolation again.

CONCLUSION

During the COVID-19 pandemic phase, we have to consider sources of possible interference such as described in this report before scheduling patients for ^{18}F -FDG PET/CT scans for various oncologic purposes.

DISCLOSURE

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Ajuria-Illarramendi O, Martinez-Lorca A, Orduna-Diez MDP. [^{18}F]FDG-PET/CT in different COVID-19 phases. *IDCases*. 2020;21:e00869.
2. Charters PFP, Little D, Rodrigues JCL, et al. ^{18}F -FDG-PET/CT findings in COVID-19: a single centre retrospective radiological review. *BJR Case Rep*. 2020;6:20200091.
3. Liu C, Zhou J, Xia L, et al. ^{18}F -FDG PET/CT and serial chest CT findings in a COVID-19 patient with dynamic clinical characteristics in different period. *Clin Nucl Med*. 2020;45:495–496.
4. Colandrea M, Gilardi L, Travaini LL, et al. ^{18}F -FDG PET/CT in asymptomatic patients with COVID-19: the submerged iceberg surfaces. *Jpn J Radiol*. 2020;38:1007–1011.
5. Deng Y, Lei L, Chen Y, et al. The potential added value of FDG PET/CT for COVID-19 pneumonia. *Eur J Nucl Med Mol Imaging*. 2020;47:1634–1635.
6. Doroudinia A, Tavakoli M. A case of coronavirus infection incidentally found on FDG PET/CT scan. *Clin Nucl Med*. 2020;45:e303–e304.
7. Martineau P, Kidane B. FDG PET/CT findings in an asymptomatic case of confirmed COVID-19. *Clin Nucl Med*. 2020;45:647–648.
8. Akerele MI, Wadhwa P, Silva-Rodriguez J, et al. Validation of the physiological background correction method for the suppression of the spill-in effect near highly radioactive regions in positron emission tomography. *EJNMMI Phys*. 2018;5:34.