

¹⁸F-FDG PET Assessment of Lewy Body Dementia with Cerebellar Diaschisis

Zaid Al-faham, Rami K. Zein, and Ching-ye Oliver Wong

Department of Diagnostic Radiology and Molecular Imaging, William Beaumont School of Medicine and Health System, Oakland University, Royal Oak, Michigan

Alzheimer disease and Lewy body dementia are the 2 most common causes of dementia. Each disease has distinctive regional metabolic reduction patterns on ¹⁸F-FDG PET. In this report, we present a rare case of an elderly man with dementia whereby ¹⁸F-FDG PET clearly showed Lewy body disease with crossed cerebellar diaschisis.

Key Words: Lewy body dementia; crossed cerebellar diaschisis; ¹⁸F-FDG PET

J Nucl Med Technol 2014; 42:306–307

DOI: 10.2967/jnmt.114.139295

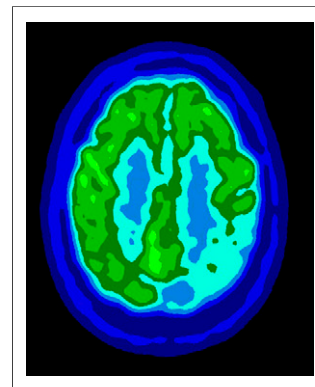
Lewy body disease and Alzheimer dementia may co-exist in the same patient and may be difficult to separate clinically or by imaging. Recognition of additional occipital cortex involvement favors the diagnosis of Lewy body disease. In this report, we present a rare case of an elderly man with dementia whereby ¹⁸F-FDG PET clearly showed asymmetric Lewy body disease with crossed cerebellar diaschisis.

CASE REPORT

A 71-y-old man with parkinsonism presented with progressively worsening short-term memory loss since 2011. The patient was complaining of motor tics and had been experiencing a decline in multiple domains, including executive functioning, visuospatial functioning, memory, language, attention, and concentration. There was no history of stroke or trauma. The patient had a mini-mental state examination score of 6/30. PET with ¹⁸F-FDG was ordered to evaluate for the etiology of the dementia.

After intravenous administration of 540.2 MBq (14.6 mCi) of ¹⁸F-FDG, multiple tomographic slices of the brain were obtained. The ¹⁸F-FDG PET scan (in quantitative scale with each color step representing 1 SD from the mean [−5.0 to +5.0]) demonstrated decreased radiotracer activity

FIGURE 1. ¹⁸F-FDG PET scan demonstrating severe decreased radiotracer activity in left parietal lobe and moderately decreased metabolism in right parietal lobe.

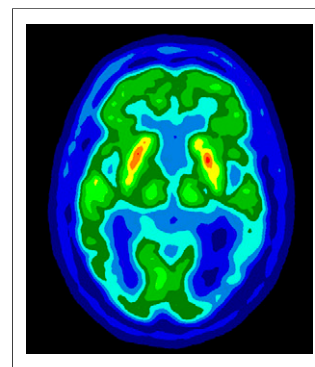


ity in the left parietal lobe, right parietal lobe, left temporal lobe, and occipital lobes (left greater than right), which is compatible with Lewy body dementia (Figs. 1 and 2). Also, there was decreased radiotracer uptake in the right cerebellum secondary to crossed cerebellar diaschisis (Fig. 3).

DISCUSSION

Lewy body dementia is the second most common cause of dementia after Alzheimer disease. Lewy body dementia manifests as widespread neuronal degeneration. The pathologic etiology centers on deposition of Lewy bodies and Lewy neurites, which contain α synuclein as a major filamentous component (1). The diagnosis of Lewy body dementia is clinical and is based on consensus guidelines (2). In some cases, it is difficult to distinguish between Alzheimer disease and Lewy body dementia clinically, and in these cases

FIGURE 2. ¹⁸F-FDG PET scan demonstrating severe decreased radiotracer activity in left temporal lobe and occipital lobes (left greater than right).



Received Feb. 19, 2014; revision accepted Apr. 8, 2014.
For correspondence or reprints contact: Zaid Al-faham, William Beaumont Hospital, 3601 W. 13 Mile Rd., Royal Oak, MI 48073.
Email: zaidfaham@gmail.com
Published online Sep. 4, 2014.
COPYRIGHT © 2014 by the Society of Nuclear Medicine and Molecular Imaging, Inc.

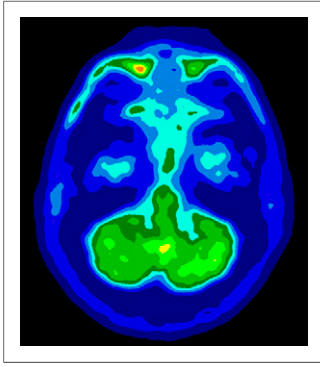


FIGURE 3. ^{18}F -FDG PET scan demonstrating crossed cerebellar diaschisis. This image shows mildly reduced metabolism in right cerebellum secondary to crossed cerebellar diaschisis.

the use of noninvasive nuclear imaging such as SPECT or ^{18}F -FDG PET is useful (2). Lewy body dementia and Alzheimer disease have a similar hypometabolic cerebral distribution with marked decreases in association cortices and relative sparing of subcortical structures and primary somatomotor cortex. However, the metabolic reduction in the occipital cortex is the key feature to support the diagnosis of Lewy body dementia (3). The reduced metabolism in the right cerebellum is consistent with diaschisis, which is defined as depression of regional neuronal metabolism and cerebral blood flow caused by dysfunction in anatomically separate but functionally related neuronal regions (4). The mechanism appears to be an interruption of the corticopontine–cerebellar pathway (5). This phenome-

non has been associated with Lewy body dementia (2) and with other cortical pathologies, specifically tumor, stroke, or trauma (5).

CONCLUSION

Alzheimer disease and Lewy body dementia are the two most common causes of dementia. Each disease has distinctive regional metabolic reduction patterns on ^{18}F -FDG PET. Therefore, knowing these patterns is important to support the likely diagnosis.

DISCLOSURE

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

REFERENCES

- Galvin JE, Uryu K, Lee VM, Trojanowski JQ. Axon pathology in Parkinson's disease and Lewy body dementia hippocampus contains alpha-, beta-, and gamma-synuclein. *Proc Natl Acad Sci USA*. 1999;96:13450–13455.
- Mirzaei S, Knoll P, Koehn H, Bruecke T. Assessment of diffuse Lewy body disease by 2- ^{18}F fluoro-2-deoxy-D-glucose positron emission tomography (FDG PET). *BMC Nucl Med*. 2003;20;3:1.
- Ishii K. PET approaches for diagnosis of dementia. *AJNR Am J Neuroradiol*. August 14, 2013 (Epub ahead of print).
- Brunberg JA, Frey KA, Horton JA, Kuhl DE. Crossed cerebellar diaschisis occurrence and resolution demonstrated with PET during carotid temporary balloon occlusion. *AJNR Am J Neuroradiol*. 1992;13:58–61.
- Mettler FA, Guiberteau, J Milton. *Essentials of Nuclear Medicine Imaging*. Philadelphia, PA: Saunders/Elsevier; 2006:388–389.