

PET/CT Pinpoints Temporal Lobe Seizure Foci

BY AMY ROTHMAN SCHONFELD
Contributing Writer

SAN DIEGO — Positron emission tomography/computed tomography can reveal seizure foci in patients with temporal lobe epilepsy who have normal magnetic resonance imaging.

PET/CT is more sensitive than ictal single-photon emission computed tomography (SPECT) imaging, MRI diffusion imag-



PET/CT findings were in accord with EEGs more often than were other imaging modalities.

DR. PILLAI

ing (MRI-DI), and electroencephalography, and can play a pivotal role in the preoperative imaging work-up of patients with temporal lobe epilepsy, Dr. Jay J. Pillai reported at the annual meeting of the American Society of Neuroradiology.

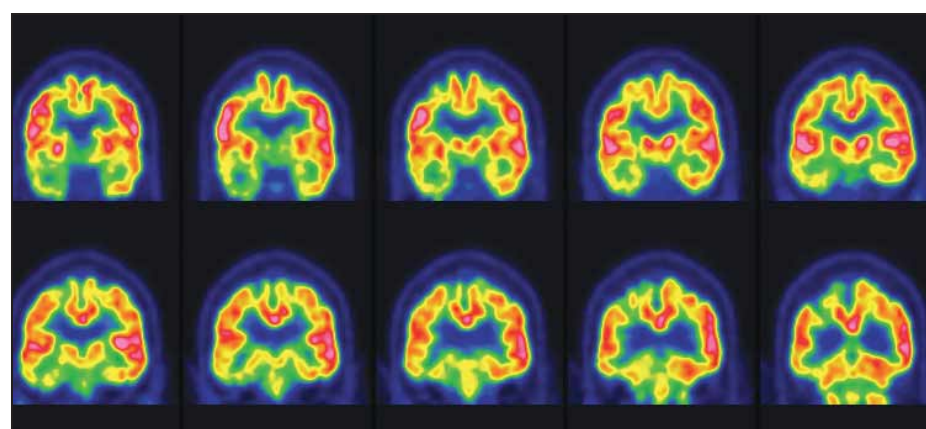
In this retrospective study, 21 patients

with EEG and clinical evidence of temporal lobe epilepsy underwent interictal PET/CT and structural MRI (1.5 Tesla), and 19 also underwent interictal MRI-DI. Ictal SPECT imaging was performed on six of these patients. Dr. Pillai stressed that these findings were only preliminary, and that additional investigation will be necessary to confirm these initial findings with a larger patient sample.

Eight patients had no structural abnormality on MRI. In all of these cases, PET/CT was able to lateralize the seizure focus. EEG was helpful in one case, and abnormal diffusion in the temporal lobes was detected with MRI-DI in two cases.

In the group overall, PET/CT was able to establish seizure focus lateralization in 95% of cases, a rate almost twice as high as that reported with structural MRI (52%), said Dr. Pillai, director of neuro-MRI at the Medical College of Georgia, Augusta. The sensitivity of PET/CT was higher than that found for ictal SPECT (83%), EEG (62%), and MRI-DI (58%).

Looking at how often the PET/CT and EEG findings concurred regarding the location of the seizure focus, Dr. Pillai found that PET/CT and EEG findings were in



Serial coronal PET/CT images show right temporal lobe interictal hypometabolism in right temporal lobe epilepsy. The right side of the image is the patient's left.

agreement 88% of the time, while lower rates of concordance were found for MRI-DI (59%) and ictal SPECT (60%). With MRI-DI, apparent diffusion coefficient (ADC) values in the abnormal temporal lobe were significantly higher than those in the normal contralateral temporal lobe. These ADC values are measures of magnitude of water diffusion in the brain.

In his presentation, Dr. Pillai described two patients in whom the various imaging modalities revealed discordant or other-

wise inconclusive results. In these instances, PET/CT demonstrated definitive lateralization of the seizure focus, which the combination of interictal EEG, structural MRI, MRI-DI, and ictal SPECT failed to show to any convincing degree.

The results suggest that PET/CT may prove to be a highly sensitive method of localizing seizure foci in the temporal lobe, especially when findings from EEG and other imaging modalities are contradictory or falsely negative.

Parkinson's Cognitive Pattern Imaged

BY KERRI WACHTER
Senior Writer

WASHINGTON — Cognitive changes in Parkinson's disease can be seen on positron emission tomography imaging and correlate well with psychological tests, according to data reported in a poster at the World Parkinson Congress.

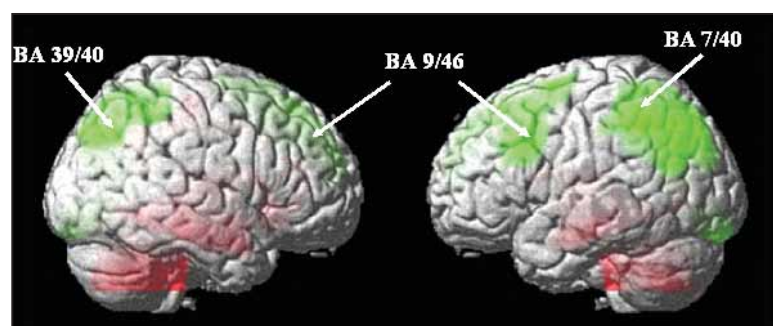
Dr. David Eidelberg, director of the Center for Neurosciences, and his colleagues at the Feinstein Institute for Medical Research at the North Shore–Long Island Jewish Health System in Manhasset, New York, studied 47 Parkinson's disease (PD) patients (31 men and 16 women) using ¹⁸fluorodeoxyglucose PET imaging to identify metabolic patterns associated with cognitive function in PD.

In addition to affect, four domains—memory/verbal learning, attention/executive function, visuospatial function, and general cognitive function—were assessed with neuropsychological testing.

"We looked for patterns in the brain that correlated with their psychologic performance," Dr. Eidelberg said.

The patients were an average age of 58 years and had PD for an average of 12 years. General cognitive function was assessed using the Mini-Mental State Examination.

Scans were analyzed using network analysis that isolates different aspects of neural circuits that correlate with cognitive function. Analysis revealed a significant pat-



Metabolic decreases in the prefrontal/frontal cortex (in green; Brodmann areas 9 and 46) and parietal cortex (Brodmann 7, 39, and 40) typify PDCP for mild/moderate cognitive impairment.

tern of covarying metabolic reductions in the parietal cortex, anterior cingulate area, and medial frontal lobe. This pattern correlated negatively with performance on the California Verbal Learning test, Stroop test, digit symbol test, and Hooper Visual Organization test, and positively with the Trail Making test, but not with affect.

The researchers also validated this PD cognitive-related pattern (PDCP) in 21 patients with PD who were scanned twice over a 2-month period. Comparison of the test-retest results showed that PDCP was highly reliable as a predictor of psychological performance.

"What makes this appealing is that there is a way to measure cognitive function indirectly," Dr. Eidelberg said.

The researchers also investigated two clinical applications for the technique. First, they computed the PD-related pattern (motor function) and PDCP in 15 early-stage patients scanned at baseline and at 2

and 4 years. PDCP expression was significantly elevated at the third time point with respect to both baseline and the second time point. "The motor pattern is higher typically and progresses like a straight line. The PDCP starts slower and may not be a straight line in terms of its evolution," he said.

In PD the motor and cognitive changes have different time courses. Cognitive changes have a later evolution in the course of the disease. "Treating the motor component of Parkinson's disease, which is what we all do, does not appear to really do much for cognition and at times makes it worse," Dr. Eidelberg said.

The findings validate PDCP as a stable and reproducible imaging marker of cognitive function in PD. Unlike the PD motor-related pattern, the nonmotor pattern evolves slowly over time and its expression is not altered by therapeutic interventions targeting the motor manifestation of PD.

Brain Deterioration Seen in Older Sleep Apnea Patients

BY SHARON
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Southeast Bureau

SALT LAKE CITY — The combination of obstructive sleep apnea and increased age may have an overwhelming effect on the brain's compensatory mechanisms, and early diagnosis and treatment of OSA in older patients may be important for preserving brain function, reported Liat Ayalon, Ph.D.

In a study Dr. Ayalon presented at the annual meeting of the Associated Professional Sleep Societies, 12 untreated OSA patients and 12 healthy good sleepers were studied with polysomnography and functional magnetic resonance imaging. The interaction between group and age in regard to effects on brain function during a verbal learning task was analyzed.

Imaging studies showed that patients' brains were able to recruit additional resources to maintain intact performance and compensate for either age or OSA. Increased brain activation was noted in both older patients and those with OSA, compared with controls, specifically in the left inferior parietal lobe, thal-

amus, caudate, middle temporal gyrus, and fusiform; in the right anterior cingulate; and in the bilateral precuneus and cerebellum.

But when patients had both increased age and OSA, decreased brain activation was noted, compared with younger patients, specifically in the right superior temporal gyrus and anterior cingulate, and in the bilateral parahippocampal gyri, caudate, precuneus, cerebellum, and fusiform gyrus, said Dr. Ayalon of the University of California, San Diego.

Patients ranged in age from 25 to 59 years. The groups were similar in age, gender, and body mass index. Average apnea-hypopnea index score—a measure of sleep apnea severity—was 35.1 in the OSA patients and 1.9 in the control group.

The findings suggest that OSA in older patients is associated with decreased functioning, as evidenced by deficiencies in word recall in this study.

Studies to address effects in even older patients (as this was a relatively young study population) and the effects of OSA treatment on brain function are planned, Dr. Ayalon said.