Antibody-Specific PET Finding in Autoimmune Encephalitis: How Accurate?

Clinical spectrum of autoimmune encephalitis (AE) is ever expanding, and it is a diagnostic challenge as symptoms are nonspecific and differential diagnosis is plenty. A diagnosis becomes more challenging when antibodies are not detected. In such cases, a diagnosis of AE is usually made upon careful exclusion of common differential diagnoses. Neuro-imaging modalities like MRI and FDG-PET are frequently used to exclude conditions, which mimic AE. FDG-PET is considered as a criterion for definite diagnosis of AE when it fulfills certain clinical, EEG and CSF criteria.[1] Few case reports and series have also described specific FDG-PET finding pattern according to antibody type.

In this study by Jha S *et al.,*[2] authors attempted to correlate FDG-PET finding with antibody serology in addition to describing different patterns of abnormal metabolism in AE. Main strength of this study compared to other similar published paper is sample size.[3] In this study, the authors included twenty-nine subjects, of which 22 were sero-positive for antibodies. FDG-PET was performed after a median interval of 12 weeks (range 2-20) from symptom onset. The delay was due to late presentation of patients to the hospital. There is a possibility of changes in patterns of metabolism as evident in FDG-PET depending on duration on illness and the time of acquisition of the scan. FDG-PET was analyzed by a blinded nuclear medicine expert both visually and semi-quantitatively. In this study, patients with Anti-NMDAR encephalitis showed hyper-metabolism in basal ganglia with hypo-metabolism in temporoparital or occipital lobe. Frontal lobe metabolism was either preserved or decreased. Though previous studies has shown different pattern of FDG uptake, most common pattern of basal ganglia hyper-metabolism with posterior temporal-parieto-occipital hypo-metabolism is consistent with findings of this study.[3-5] In LGI1 encephalitis group, increased uptake FDG-PET in medial temporal lobe is consistent with previous literature. Similar to this study, fronto-parietal hypo-metabolism was also reported in a study by Moreno-Ajona *et al*.[3] Four patients with anti-CASPR2 encephalitis also showed basal ganglia increased uptake. No specific pattern was noted in antibody negative subjects, though four subjects showed hyper-metabolism in frontal and temporal lobes. Another study by Probasco JC *et al*.[6] also failed to demonstrate any specific FDG-PET abnormality pattern in antibody negative patients. The cohort had single GAD-65 encephalitis, which showed bilateral basal ganglia and temporal hypo-metabolism. This study again establishes the fact that FDG-PET is more sensitive than MRI in diagnosis of AE. Blinded nuclear medicine expert could correctly predict serology status in 66% cases of anti-NMDAR and 50% cases of LGI1 encephalitis. Another interesting observation made in this study was – visual analysis was better than semi-quantitative method in determining hyper-metabolism, whereas it was opposite for hypo-metabolism. To arrive on a conclusion regarding the pattern of FDG-PET in seronegative and anti-GAD-65 encephalitis would require more studies with larger sample size.

Antibody-specific area of abnormality in FDG-PET uptake is due to different brain area involvement in different types of AE. Differential expressions of LGI1 receptors in temporal lobe also suggest heterogeneous affinity of auto-antibodies to different areas of brain. Clinical presentation also provides a clue to areas of brain affected in AE. Clinical utility of FDG-PET in diagnosis of AE is proved by various previous studies. The present study adds more information regarding antibody-specific FDG-PET avidity in the brain parenchyma. The findings in antibody negative AE, though in very few subjects, are a promising finding. Interval whole-body PET scans to look for malignancy are a routine practice, and it gives an opportunity to study abnormal brain metabolism in the clinical course. A larger study with larger sample size of antibody negative AE would be more conclusive. Another finding of the study which needs for research is discordant hypo- and hyper-metabolism in visual analysis and semi-quantitative analysis.

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