

Comparison of eZIS z-score using [^{99m}Tc]ECD SPECT and SUVR using the radioligand [¹⁸F]AV-45

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Abstract

Background and Purpose: Single photon emission computed tomography (SPECT) is more widespread than positron emission tomography (PET) in medical facilities. Evaluation of brain perfusion with the Easy-Z-score Imaging System (eZIS) z-score using ^{99m}Tc-ethyl cysteinate dimer (ECD) SPECT is performed in many medical facilities. This study examined the usability of eZIS z-score using [^{99m}Tc]ECD SPECT in comparison with standardized uptake value ratios (SUVRs) using [¹⁸F]AV-45 PET for patients with Alzheimer's disease (AD), mild cognitive impairment (MCI), or frontotemporal lobar degeneration (FTLD).

Methods: We performed [^{99m}Tc]ECD SPECT and [¹⁸F]AV-45 PET on 19 patients with probable AD, 11 patients with MCI, and 10 patients with FTLD. Dynamic PET was performed from 0 to 80 min after [¹⁸F]AV-45 tracer injection (370 MBq), and time-activity curves were constructed. The standardized uptake value and cortex-to-cerebellum SUVR were calculated for cortical (frontal, temporal, parietal, and occipital lobes) regions of interest. Normal SUVR was calculated as <1.25 for cortical lobes without the occipital lobes. SPECT was performed from 10 to 40 min after [^{99m}Tc]ECD tracer injection (600 MBq), and z-scores were calculated for the posterior cingulate gyrus. Normal z-score was calculated as <1.19 at the posterior cingulate gyrus. We compared eZIS z-score using [^{99m}Tc]ECD SPECT and SUVR using [¹⁸F]AV-45 PET.

Results: Assuming amyloid PET positive was the background for AD brain pathology, the z-score offered 82% sensitivity and 50% specificity. Sensitivity was satisfactory, but specificity was not.

Conclusion: Because z-score may be influenced brain atrophy, diagnosis using z-score alone is not feasible. It may be necessary to general judgment referring to clinical findings, clinical course and amyloid PET.