

# Prospective evaluation of technetium-99m ECD SPET in mild traumatic brain injury for the prediction of sustained neuropsychological sequels

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## Abstract

*Our aim* was to evaluate whether single photon emission tomography (SPET) versus computed tomography (CT) in acute phase of mild traumatic brain injury (MTBI) was better for the prediction of sustained neuropsychological symptoms beyond a typical recovery period. *Forty five patients* with MTBI were prospectively evaluated with clinical and neuropsychological exams, structural imaging using CT and perfusion study by <sup>99m</sup>Tc-ethylene cysteinyl dimer (<sup>99m</sup>Tc-ECD) SPET within a week of the head trauma. After an interval ranging from 6 to 12 (median: 9) months, all patients were re-evaluated by standard neuropsychological tests for the assessment of sustained personality changes, imbalance and memory deficits. *Our results* showed that, 25 patients had abnormal brain perfusion on <sup>99m</sup>Tc-ECD SPET. In 19 cases of total 20 normal <sup>99m</sup>Tc-ECD SPET studies, no sign of memory deficit and imbalance was observed. Negative predictive value (NPV) for both complications was 95%. NPV of CT for the prediction of memory deficit and imbalance were 77.4% and 90.3%, respectively. The risk of developing sustained memory deficits and imbalance in patients with positive <sup>99m</sup>Tc-ECD SPET were 40% and 20%, respectively. A perfusion abnormality on <sup>99m</sup>Tc-ECD SPET was associated with a greater chance of long-standing memory deficits (odds ratio=13.49, P=0.020) while neither CT nor <sup>99m</sup>Tc-ECD SPET could independently predict the personality changes in these patients. The patients with abnormalities on both CT and SPET images faced a significant relative risk of complications, 1.63 times, higher than the others. *In conclusion*, our study indicated that <sup>99m</sup>Tc-ECD SPET imaging or CT imaging alone, could not predict the occurrence of sustained complications after MTBI. Concurrent use of both imaging modalities performed shortly after MTBI may yield the best results, as the combination of abnormalities in both cerebral structure and perfusion could indicate the patients with 1.63 times higher risk of sustained memory deficits, personality changes and imbalance.

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