Three-dimensional stereotactic surface projection of brain perfusion SPECT improves diagnosis of Alzheimer's disease

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Objectives: Alzheimer's disease (AD) is diagnosed by either inspection of the brain perfusion SPECT, or three-dimensional stereotactic surface display (3D-SSP). The purpose was to compare diagnostic performances of these methods. *Methods:* Sixteen nuclear medicine physicians independently interpreted ^{99m}Tc-ECD SPECT in one session and SPECT with 3D-SSP in another session without clinical information for 50 studies of AD patients and 40 studies of healthy volunteers. Probabilities of AD were reported according to a subjective scale from 0% (normal) to 100% (definite AD). Receiver operating characteristics curves were generated to calculate areas under the ROC curves (Az's) for the inspection as well as for an automated diagnosis based on a mean Z value in the bilateral posterior cingulate gyri in a 3D-SSP template. *Results:* Mean Az for visual interpretation of SPECT alone (0.679 ± 0.058) was significantly smaller than that for visual interpretation of both SPECT and 3D-SSP (0.778 ± 0.060). Az for the automated diagnosis (0.883 ± 0.037) was significantly greater than that for both modes of visual interpretation. *Conclusions:* 3D-SSP enhanced performance of the nuclear medicine physicians inspecting SPECT. Performance of the automated diagnosis exceeded that of the physicians inspecting SPECT with and without 3D-SSP.

Key words: brain perfusion SPECT, ROC analysis, Alzheimer's disease, image processing, automated diagnosis