

Case Report: Alzheimer's Disease (Early Stage)

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Patient history

82-year-old woman with progression of memory impairment and disorientation pointed out by family. Revised Hasegawa Dementia Rating Scale (HDS-R) was within lower normal limit (22/30).

Imaging findings

All images have been acquired using our 3T MAGNETOM Trio with the Head Matrix coil.

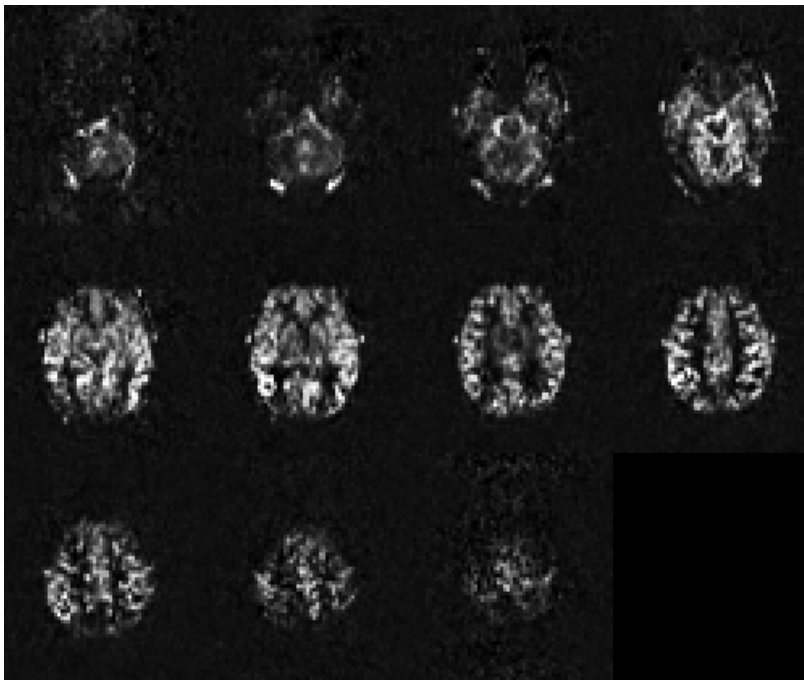


Figure 1: Perfusion-weighted image by pulsed arterial spin labeling (PASL), TR: 2500 ms, TE: 11 ms, T11: 700 ms, T11stop: 1600 ms, T12: 1800 ms, slice thickness: 8 mm, slice gap: 35%, number of slices: 11, matrix: 64, FOV: 256 mm, Acquisition time: 4 min 10 sec.

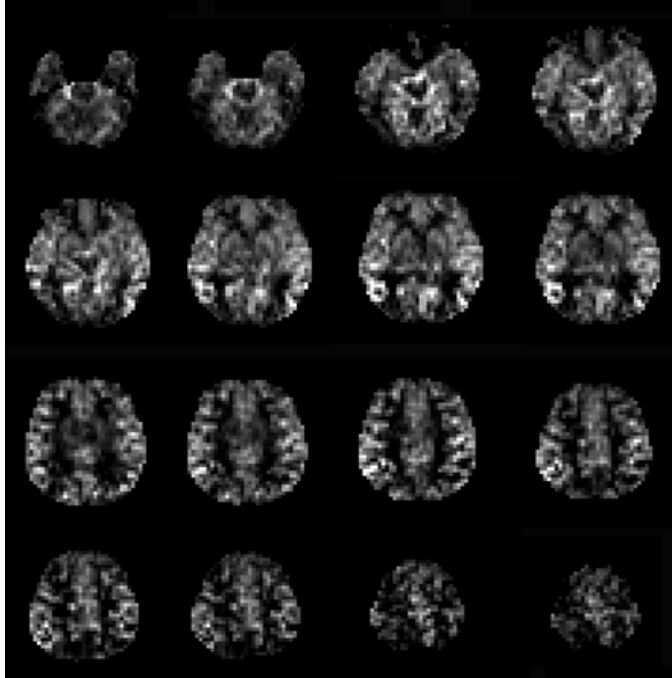


Figure 2: Processed perfusion-weighted images by inter-slice interpolation and masking of extra-brain signals for statistical image analysis.

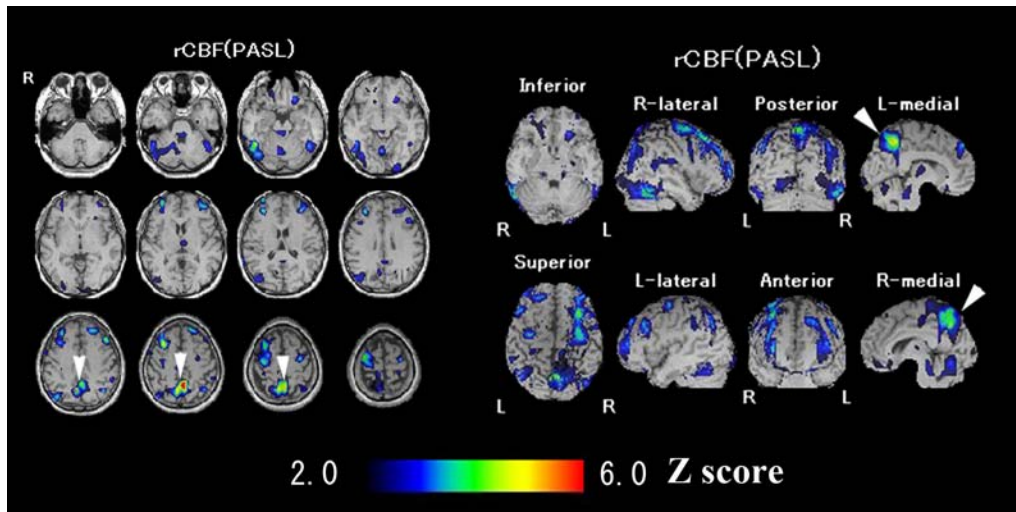


Figure 3: Statistical image analysis of regional cerebral blood flow (rCBF) measured by PASL as compared to age-matched normal database from 36 control subjects after anatomic standardization to the brain template. A color bar represents relative decrease by voxel-by-voxel Z score analysis after voxel normalization to global mean values [$Z\text{-score} = (\text{control mean} - \text{individual value}) / \text{control SD}$]. Z score maps with a range of 2 to 6 are overlaid on transaxial slices and surface rendering of the standardized brain. Reduction of rCBF was observed in bilateral posterior cingulate gyri and precuneus (arrowheads), parietal, and frontal lobes.

Discussion

In the early stage of Alzheimer's disease, a decrease of rCBF as well as glucose metabolism in the posterior cingulate gyri and precunei has been observed with PET or SPECT. Statistical image analysis has allowed these observations. We can apply this statistical image analysis also to PASL data after construction of normal database. PASL data covering the whole brain are necessary for anatomic standardization. Using this technique, significant decrease of rCBF was observed in the posterior cingulate gyri and precunei in the present case. Whole-brain PASL has possibility to replace PET or SPECT in the early diagnosis of Alzheimer's disease.

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