Arterial spin labeling may contribute to the prediction of cognitive deterioration in healthy elderly individuals.

P. Giannakopoulos

Department of Psychiatry, University of Geneva School of Medicine, 2, ch Petit Bel-Air, 1225 Geneva, Switzerland, tel : 0041223055006, fax : 0041223055044

Cerebrovascular imaging is of great interest in the understanding of neurological disease. Among the different magnetic resonance imaging (MRI) parameters, arterial spin labeling (ASL) provides metrics of major vessel anatomy and tissue perfusion.

To explore whether ASL imaging in cognitively intact elderly individuals may be used to predict subsequent early neuropsychological decline, we performed a longitudinal study of 148 community-dwelling elderly control, 75 of whom had stable cognitive function (sCON) (mean age, 75.9 years ± 3.4 [standard deviation]; 43 female) and 73 of whom had deteriorated cognitive function (dCON) at 18-month clinical follow-up (mean age, 76.8 years ± 4.1; 44 female). An additional 65 patients with mild cognitive impairment (MCI) (mean age, 76.2 years ± 6.1; 25 female) were also included. Two-dimensional pulsed ASL was performed at the baseline visit. Statistical analysis included whole-brain voxelwise analysis of the ASL relative cerebral blood flow (CBF) data, receiver operating characteristic (ROC) curve analysis of the posterior cingulate cortex (PCC), and voxel-based morphometry analysis of gray matter.

The voxelwise comparison of ASL revealed decreased relative CBF in the dCON group compared with that in the sCON group and slightly more pronounced relative CBF in the MCI group compared with that in the sCON group, most notably in the PCC (P < .05 corrected). Comparison of the dCON group with the MCI group revealed no significant differences. ROC analysis of relative CBF in the PCC enabled discrimination of dCON (P < .001; area under the ROC curve, 0.66). There was no confounding focal gray matter atrophy.

Reduced ASL in the PCC at baseline is associated with the development of subsequent subtle neuropsychological deficits in healthy elderly control subjects. At a group level, ASL patterns in subjects with dCON are similar to those in patients with MCI at baseline, suggesting that these subjects may initially maintain their cognitive status via mobilization of their neurocognitive reserve at baseline; however, they are likely to develop subsequent subtle cognitive deficits.