The influence of cognitive reserve on inter-individual variability in resting-state cerebral metabolism in normal aging

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There is a great deal of heterogeneity in the impact of aging on cognition and cerebral functioning. One potential factor contributing to individual differences among the elders is cognitive reserve which designates the partial protection from the deleterious effects of aging that lifetime experience provides. Neuroimaging studies examining task-related activation in elderly people suggested that cognitive reserve takes the form of more efficient use of brain networks and/or greater ability to recruit alternative networks to compensate for age-related cerebral changes. The current study examined the relationships between cognitive reserve, as measured by education and verbal intelligence, and cerebral metabolism at rest (FDG-PET) in a sample of 74 older participants. Higher degree of education and verbal intelligence was associated with lower metabolic activity in the right posterior temporoparietal cortex and the left anterior intraparietal sulcus. Functional connectivity analyses of resting-state fMRI images in a subset of 41 participants indicated that these regions belong to the default mode network and a frontoparietal network respectively. The findings suggest that higher cognitive reserve is related to relatively more efficient (i.e. lower) “resting” activity in specific regions of two functional networks involved in internal mentation and goal-directed attention.

Acknowledgements

This work was supported by the Inter-University Attraction Pole [grant numbers P6/29 and P7/11], the French-speaking Community of Belgium [ARC 06/11-340], the F.R.S.-FNRS, the University of Liège, the Research Focus on Interdisciplinary Neurosciences IFSN of the University of Mainz, Agence Nationale de la Recherche (ANR LONGVIE 2007), Programme Hospitalier de Recherche Clinique (PHRC National 2011), Région Basse Normandie and Institut National de la Santé et de la Recherche Médicale (INSERM).

Keywords:

aging, cognitive reserve, FDG-PET, resting-state fMRI, memory