Structural and functional asymmetries in cognitively normal older adults with significant memory concerns

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Background: Previous studies have suggested that subjective self-reports of subtle cognitive changes in healthy older adults is associated with increased risk for future cognitive decline and dementia [1, 2]. Common neuropsychological tests cannot detect any objective cognitive deficits in elderly individuals with significant memory concerns (SMCs), relative to older adults without memory concerns (HCs). In this study, we were interested in the functional neuronal coupling between regions showing grey matter asymmetries between SMCs and HCs, as revealed using a standardized protocol for voxel-wise asymmetry analysis [3].

Methods: Resting-state and anatomical T1 scans were obtained from the ADNI database (http://adni.loni.usc.edu) for 19 +SMCs and 19 age-, gender- and education-matched -SMCs. All subjects were right-handed and had normal cognitive performance assessed by common cognitive tests, with no informant-based complaint of memory impairment or decline. SMCs were classified using the Cognitive Change Index (CCI>16). Data were processed in SPM12 (v12.2; http://www.fil.ion.ucl.ac.uk) and the CONN toolbox (http://www.nitrc.org/projects/conn). Masks for the left and right thalamus were created in the Anatomy Toolbox v2.1 [4] based on Oxford’s thalamic connectivity atlas [5].

Results: The whole-brain voxel-based analysis revealed grey matter asymmetries in SMCs, relative to HCs, which were characterized by lower leftward-biased grey matter volume in the thalamus (pFWE<0.05). Bilateral thalamus was used as a region of interest in the subsequent seed-based functional connectivity analysis. Functional connectivity between both right and left thalamus and precuneus was more asymmetrical in HCs than in SMCs (punc.<0.001). However, the functional asymmetry found between the two groups did not survive the correction for multiple comparisons.

Conclusions: Our result points to the existence of structural and functional asymmetries in grey matter volume, which needs to be further explored. However, the question whether these results have any biological underpinning remains unsolved.

References: