Introduction

Patients with amnestic Mild Cognitive Impairment (aMCI) have clear deficits in episodic memory and it is considered to be a prodromal phase of Alzheimer’s Disease. In contrast, their working memory remains relatively preserved. Some previous fMRI work has looked at working memory in aMCI but results are mixed. Aims

Investigation of fMRI BOLD activity in aMCI patients during a working memory task, compared to healthy controls. Are there behavioural and/or fMRI BOLD differences between the groups?

Methods

Participants

10 aMCI patients, 11 healthy matched controls

aMCI Diagnosis based on Petersen Criteria: • Memory complaints • Objective memory impairment • Other cognitive function normal • CDR score of 0.5 • Intact activities in everyday life

Procedure

Neuropsychological assessment carried out to include tests of memory, executive function and intelligence.


Image Acquisition and Analysis

Scanning was performed on a 3T GE scanner (38 slices, TR 2000ms, TE 30ms). High resolution T1-SPGR structural scan also collected

Pre-processing and analysis used SPM8. Normalisation carried out with DARTEL. Smoothed with an 8mm FWHM Gaussian kernel. Movement included as covariate in 1st level models. Age and IQ included as covariates in 2nd level models

Control group activity looked at first and then compared to aMCI patients

Cluster level statistics reported throughout

Results

fMRI: Control Group Task Activations

1-Back and 2-Back versus 0-Back

Significant activations in expected areas

Slices through the peak voxels from table above:

Rendering of significant clusters:

Discussion

Patients recruited additional brain regions compared to controls, in particular, the right insula:

● Known to be recruited in working memory tasks
● Grey matter loss is a common feature of MCI

Could this be a mechanism to compensate for mild neuronal loss?

These network differences were present despite only mild impairment in behaviour

Expanding beyond spatial and episodic memory tasks in MCI may help understand neural changes more fully


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Alterations in working memory networks in amnestic Mild Cognitive Impairment

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Rendering of significant clusters:

(fMRI BOLD activity in aMCI patients during a working memory task, compared to healthy controls. Are there behavioural and/or fMRI BOLD differences between the groups?)

Behavioural performance as indicated by reaction time (RT), some differences on easier levels for aMCI compared to controls, in particular, the right insula. Patients impaired on memory tasks for reaction time (RT), some differences on easier levels for aMCI compared to controls.

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