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DEMENTIA IN ALZHEIMER'S DISEASE: A COMPARISON OF MRI AND 1H-MRS FINDINGS BETWEEN ALZHEIMER'S DISEASE AND MILD COGNITIVE IMPAIRMENT

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Aim: To compare Magnetic Resonance Imaging (MRI) and Magnetic Resonance Spectroscopy (1H-MRS) between people with Alzheimer's disease (AD) and mild cognitive impairment (MCI).

Background review: AD is characterised by cognitive impairment. 10-15% of people with MCI progress to dementia each year. The hippocampus is involved in memory functioning and is one of the brain regions first affected by AD. MRI based hippocampal volumetric measurement enables accurate quantification of atrophy. In addition, 1H-MRS can be used to measure concentrations of brain metabolites including myoinositol (mI) and N-acetylaspartate (NAA). NAA is a proxy measure of neuronal density.

Method: Subjects with AD (n=46), MCI (n=28) and controls (n=39) were scanned using a 1.5 Tesla MR system. Manual tracing of hippocampal volumes was undertaken using Measure software. 1H-MRS voxels of interest were defined in the left and right hippocampi. A point-resolved spectroscopy pulse sequence produced spectra from each voxel and clearly resolved NAA and mI peaks. Statistical analysis was undertaken using SPSS15.

Results: Hippocampal volumes were significantly reduced between AD and controls ($p=0.003$) and between AD and MCI ($p=0.001$). Compared to controls, individuals with AD and MCI had a significant reduction in [NAA]. MCI showed a non-significant increase in [mI]. A positive relationship was found between hippocampal volume and [NAA] and between hippocampal volume and [mI] for MCI.

Conclusions: AD is associated with decreased viable neuronal density/function (as measured by NAA) and a reduction in hippocampal volume associated with impaired cognitive functioning. The elevated [mI] in MCI may be a "tipping point" into dementia.