Depression Predicts Progressive Brain Atrophy in Mild Cognitive Impairment: An ADNI study

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Abstract

Background and Objective: Depression has been shown to predict higher rates of progression from mild cognitive impairment (MCI) to Alzheimer's disease (AD). The current study examined the underlying neuroanatomical changes associated with depression in MCI patients. Tensor-based morphometry (TBM) was used to compare the longitudinal progression of brain atrophy in MCI patients with and without depression.

Methods: 245 subjects from the Alzheimer's Disease Neuroimaging Initiative (ADNI) who were diagnosed with MCI and had MRI scans at baseline and 2-year follow-up were included in the present study. The subjects, ranging in age from 55 to 90 (mean age=74.9 years, sd=7.0), were divided into three groups based on their scores from the Neuropsychiatric Inventory Questionnaire (NPI-Q): individuals with reported depression (DEP, n=47), with any other neuropsychiatric symptom except depression (OTHER, n=92), and with no neuropsychiatric symptoms (NOSYMP, n=106). TBM was used to create 3D Jacobian maps of local brain atrophy rates for individual participants, which were then compared across the three groups.

Results: Regional analyses were performed and direct comparisons between groups (corrected for multiple comparisons using permutation tests) revealed significantly higher rates of temporal (p=.03), parietal (p=.03), and left frontal (p=.02) white matter atrophy in the DEP group compared to the NOSYMP group. The DEP group also demonstrated greater atrophy compared to the OTHER group in frontal and parietal white matter regions, though permutation tests did not reach significance. Comparisons between the OTHER and NOSYMP groups revealed no significant differences in rates of atrophy over 2 years.

Conclusions: The presence of depressive symptoms in MCI subjects was associated with increased white matter atrophy in regions known to be affected as AD progresses. These findings suggest that depression in individuals with MCI may reflect underlying pathological changes that represent prodromal AD. Thus, assessment of depressive symptoms may be a potentially useful clinical marker in identifying MCI patients who are most likely to progress to AD.