

¹H MRS Findings Differ among Mild Cognitive Impairment Syndromes

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Introduction:

The broad concept of mild cognitive impairment (MCI) includes amnestic MCI, multiple domain MCI, and single non-memory domain MCI. While most individuals with amnestic MCI progress to Alzheimer's disease (AD), outcome of the other MCI syndromes is not yet clear. It is possible that non-amnestic MCI syndromes may represent prodromal stages of dementias other than AD. ¹H MR spectroscopy (¹H MRS) metabolite markers may be useful in differentiating patients with MCI who will progress to AD in the future. We have previously shown that myo-inositol /Creatine (mI /Cr) levels are elevated in patients with amnestic MCI¹. The objective of this study was to determine if (¹H MRS) findings differ among patients with amnestic MCI, single non-memory domain MCI, and multiple domain MCI.

Methods:

We studied 336 cognitively normal elderly, 78 patients with amnestic MCI, 33 patients with multiple domain MCI, and 16 patients with single non-memory domain MCI, who underwent a single voxel ¹H MRS from the posterior cingulate gyri with TR / TE =2000 / 30 ms. We compared metabolite ratios of normals, and patients with different MCI syndromes using analysis of variance (ANOVA) and post hoc t-tests.

Results:

Patients with amnestic MCI had higher myo-inositol / Creatine (mI /Cr) and choline (Cho) /Cr ratios than normal, patients with multi-domain MCI had higher Cho /Cr and lower N-acetylaspartate (NAA) /Cr ratios than normal, and patients with single non-memory domain MCI had normal metabolite levels.

Table: Mean \pm SD of ¹H MRS metabolite ratios in patients with different MCI syndromes.

	Normal	Amnestic MCI	Multiple domain MCI	Single non-memory domain MCI
N	336	78	33	16
NAA /Cr	1.53 \pm 0.12	1.52 \pm 0.11	1.47 \pm 0.10*	1.54 \pm 0.10
Cho /Cr	0.66 \pm 0.07	0.68 \pm 0.08**	0.69 \pm 0.08**	0.67 \pm 0.08
mI /Cr	0.67 \pm 0.08	0.69 \pm 0.07*	0.66 \pm 0.08	0.65 \pm 0.10

Metabolite ratios are different normal on t-tests * $p < 0.01$, ** $p < 0.05$.

Conclusion:

The pattern of ¹H MRS metabolite changes were different among patients with different MCI syndromes. Patients with amnestic MCI, most of whom progress to AD in the future, have elevated mI /Cr levels. Normal mI /Cr levels in patients with multiple domain MCI and single non-memory domain MCI suggest that some of these patients may represent prodromal stages of dementias other than AD.

¹Kantarci K, Jack CR, Jr., Xu YC, Campeau NG, O'Brien PC, Smith GE, et al. Regional metabolic patterns in mild cognitive impairment and Alzheimer's disease: A ¹H MRS study. *Neurology* 2000;55(2):210-217.

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