The goal of this study was to predict episodic memory change with several markers of neurodegenerative processes in patients with mild cognitive impairment (MCI). Cross sectional studies have shown that degeneration of the basal forebrain cholinergic system (BFCS) is associated with cognitive decline in MCI. Longitudinally, atrophy rates in the BFCS - but not in the hippocampus – were predictive of general cognitive decline in a sample of healthy elderly participants and patients with mild AD.

We obtained baseline and follow-up data in healthy elderly participants as well as in patients with MCI within a time interval of 1.5 years (range: 15-18 months). We extracted grey matter volumes of the BFCS (CH 1-4) and automatically processed MRI data with the FreeSurfer longitudinal stream (version 6.0.0). For the evaluation of verbal episodic memory, we repeatedly assessed the delayed free recall by using the verbal learning and memory test (VLMT).

We used a linear mixed model, which allows to include drop-outs’ baseline data. A significant main effect of change in hippocampal volume ($F_{(1, 96.91)} = 7.52, p = 0.007$) indicated a relationship with changes in verbal delayed recall performance for patients with MCI compared to healthy controls. BFCS volume changes ($F_{(1, 91.98)} = 0.3, p = 0.59$) did not show this association. Mean outcome values of the included variables are shown in Fig. 1.

Verbal episodic memory dysfunction in MCI is linked primarily to neurodegeneration in the hippocampus and not to changes in the cholinergic system. Thus, both current memory performance and the longitudinal change in episodic memory is related to severity of hippocampal damage in MCI.

Following up the presented analysis, we will use a logistic regression approach to classify participants according to their atrophy in the BFCS and the hippocampus (both cross-sectional and longitudinal). This will allow us to further our understanding of brain changes in MCI and their impact on cognitive functioning.

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