Introduction: Hippocampal atrophy is an early marker of Alzheimer's disease (AD). Patients with AD and amnestic mild cognitive impairment (aMCI) experience spatial navigation difficulties, especially in hippocampus-dependent allocentric navigation. Spatial navigation testing in the human analogue of the Morris Water Maze (hMWM) can separately examine two types of navigation (allocentric vs. egocentric).

Aims: To assess the relationship between allocentric spatial navigation impairment and hippocampal atrophy in AD and aMCI subjects.

Methods: 48 subjects (20 aMCI, 14 mild AD and 14 age-matched controls, NC) underwent spatial navigation testing in the hMWM, in an enclosed arena 2.9 m in diameter with external navigation cues on the wall and in its virtual 2D computer version. Brain MRI was performed and an automatic software was used to measure the total brain, right and left hippocampal volumes. Volumes were correlated with spatial navigation test results.

Results: The aMCI and AD groups performed worse than NC in hMWM (p< 0.001). Right and left hippocampal volumes were smaller in aMCI and AD groups relative to NC (p< 0.005). Right (p< 0.05, r=-0.7) and left (p< 0.05, r=-0.59) hippocampal volumes correlated with hMWM results, regardless of the diagnosis.

Conclusion: Significant correlation of hMWM performance and hippocampal volume (especially with the right one) underlines the importance of this structure for allocentric navigation in aMCI and AD subjects. Hippocampal volumetry and spatial navigation tests can serve as reliable diagnostic tools in prodromal AD.