Abstract


Vitamin B-12 concentration, memory performance, and hippocampal structure in patients with mild cognitive impairment.

Department of Neurology, NeuroCure Cluster of Excellence, Department of Neurology, Max Planck Institute of Human Cognitive and Brain Sciences, Leipzig, Germany; Sonderforschungsbereich 1052 Obesity Mechanism Subproject A1, University of Leipzig, Leipzig, Germany; Biostatistics and Clinical Epidemiology, and Institute of General Practice, Goethe-University, Frankfurt am Main, Germany; Department of Nutrition Physiology and Human Nutrition, Gottfried Wilhelm Leibniz University, Hannover, Germany; Practice Bohlken for Neurology and Psychiatry, Berlin, Germany; Department of Psychiatry, Psychotherapy and Psychosomatic, University Medicine, Halle/Saale, Germany; Department of Neurology, NeuroCure Cluster of Excellence, Center for Stroke Research Berlin, Charité - University Medicine Berlin, Berlin, Germany.

BACKGROUND: Low-normal concentrations of vitamin B-12 (VitB12) may be associated with worse cognition. However, previous evidence has been mixed, and the underlying mechanisms remain unclear.

OBJECTIVE: We determined whether serum VitB12 concentrations within the normal range were linked to memory functions and related neuronal structures in patients with mild cognitive impairment (MCI).

DESIGN: In a cross-sectional design, we assessed 100 amnestic MCI patients (52 women; age range: 50-80 y) with low- and high-normal VitB12 concentration (median split: 304 pmol/L) for memory functions with the use of the Auditory Verbal Learning Test. MRI was performed at 3 tesla (n = 86) for the estimation of the volume and microstructure of the hippocampus and its subfields as indicated by the mean diffusivity on diffusion-weighted images. With the use of a mediation analysis, we examined whether the relation between VitB12 and memory performance was partially explained by volume or microstructure.

RESULTS: MCI patients with low-normal VitB12 showed a significantly poorer learning ability (P=0.014) and recognition performance (P=0.008) than did patients with high-normal VitB12. Also, the microstructure integrity of the hippocampus was lower in patients with low-normal VitB12, mainly in the cornu ammonis 4 and dentate gyrus region (P=0.029), which partially mediated the effect of VitB12 on memory performance (32-48%). Adjustments for age, sex, education, apolipoprotein E e4 status, and total homocysteine, folate, and creatinine did not attenuate the effects.

CONCLUSIONS: Low VitB12 concentrations within the normal range are associated with poorer memory performance, which is an effect that is partially mediated by the reduced microstructural integrity of the hippocampus. Future interventional trials are needed to assess whether supplementation of VitB12 may improve cognition in MCI patients even in the absence of clinically manifested VitB12 deficiency. This trial was registered at clinicaltrials.gov as NCT01219244.

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