Effects of Molecular Hydrogen Assessed by an Animal Model and a Randomized Clinical Study on Mild Cognitive Impairment.

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Abstract

BACKGROUND: Oxidative stress is one of the causative factors in the pathogenesis of neurodegenerative diseases including mild cognitive impairment (MCI) and dementia. We previously reported that molecular hydrogen (H2) acts as a therapeutic and preventive antioxidant.

OBJECTIVE: We assess the effects of drinking H2-water (water infused with H2) on oxidative stress model mice and subjects with MCI.

METHODS: Transgenic mice expressing a dominant-negative form of aldehyde dehydrogenase 2 were used as a dementia model. The mice with enhanced oxidative stress were allowed to drink H2-water. For a randomized double-blind placebo-controlled clinical study, 73 subjects with MCI drank ~300 mL of H2-water (H2-group) or placebo water (control group) per day, and the Alzheimer's Disease Assessment Scale-cognitive subscale (ADAS-cog) scores were determined after 1 year.

RESULTS: In mice, drinking H2-water decreased oxidative stress markers and suppressed the decline of memory impairment and neurodegeneration. Moreover, the mean lifespan in the H2-water group was longer than that of the control group. In MCI subjects, although there was no significant difference between the H2- and control groups in ADAS-cog score after 1 year, carriers of the apolipoprotein E4 (APOE4) genotype in the H2-group were improved significantly on total ADAS-cog score and word recall task score (one of the sub-scores in the ADAS-cog score).

CONCLUSION: H2-water may have a potential for suppressing dementia in an oxidative stress model and in the APOE4 carriers with MCI.

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KEYWORDS: ADAS-cog score; ApoE4; aldehyde dehydrogenase 2; hydrogen; hydrogen water; mild cognitive impairment; oxidative stress; randomized clinical study

PMID: 29110615 DOI: 10.2174/1567205014666171106145017