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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

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