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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.

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

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Figures

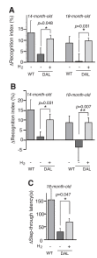


Fig. (1) Hydrogen water prevented cognitive decline....

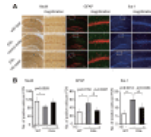


Fig. (2) Hydrogen water suppressed neurodegeneration. (...

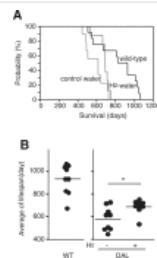


Fig. (3) Extension of the average lifespan...



Fig. (4) Profile of the recruitment, randomization,...

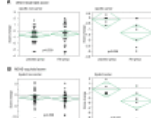


Fig. (5) Distribution of changes of sub-...

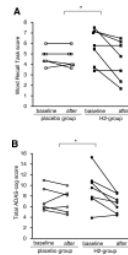


Fig. (6) Changes in a sub-score and...

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