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# Drinking hydrogen water enhances endurance and relieves psychometric fatigue: a randomized, double-blind, placebo-controlled study <sup>1</sup>

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## Abstract

Acute physical exercise increases reactive oxygen species in skeletal muscle, leading to tissue damage and fatigue. Molecular hydrogen (H<sub>2</sub>) acts as a therapeutic antioxidant directly or indirectly by inducing antioxidative enzymes. Here, we examined the effects of drinking H<sub>2</sub> water (H<sub>2</sub>-infused water) on psychometric fatigue and endurance capacity in a randomized, double-blind, placebo-controlled fashion. In Experiment 1, all participants drank only placebo water in the first cycle ergometer exercise session, and for comparison they drank either H<sub>2</sub> water or placebo water 30 min before exercise in the second examination. In these healthy non-trained participants (*n* = 99), psychometric fatigue judged by visual analogue scales was significantly decreased in the H<sub>2</sub> group after mild exercise. When each group was divided into 2 subgroups, the subgroup with higher visual analogue scale values was more sensitive to the effect of H<sub>2</sub>. In Experiment 2, trained participants (*n* = 60) were subjected to moderate exercise by cycle ergometer in a similar way as in Experiment 1, but exercise was performed 10 min after drinking H<sub>2</sub> water. Endurance and fatigue were significantly improved in the H<sub>2</sub> group as judged by maximal oxygen consumption and Borg's scale, respectively. Taken together, drinking H<sub>2</sub> water just before exercise exhibited anti-fatigue and endurance effects.

**Keywords:** Borg's scale; O max; bicyclette ergométrique; cycle ergometer; eau hydrogénée; endurance; essai clinique avec répartition aléatoire; exercice physique; exercice; fatigue; hydrogen; hydrogen water; hydrogène; randomized clinical trial; visual analogue score; échelle de Borg; échelle visuelle analogue.

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