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Hydrogen-rich water decreases serum LDL-cholesterol levels and improves HDL function in patients with potential metabolic syndrome

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Abstract

We have found that hydrogen (dihydrogen; H2) has beneficial lipid-lowering effects in high-fat diet-fed Syrian golden hamsters. The objective of this study was to characterize the effects of H2-rich water (0.9-1.0 l/day) on the content, composition, and biological activities of serum lipoproteins on 20 patients with potential metabolic syndrome. Serum analysis showed that consumption of H2-rich water for 10 weeks resulted in decreased serum total-cholesterol (TC) and LDL-cholesterol (LDL-C) levels. Western blot analysis revealed a marked decrease of apolipoprotein (apo)B100 and apoE in serum. In addition, we found H2 significantly improved HDL functionality assessed in four independent ways, namely, i) protection against LDL oxidation, ii) inhibition of tumor necrosis factor (TNF)-α-induced monocyte adhesion to endothelial cells, iii) stimulation of cholesterol efflux from macrophage foam cells, and iv) protection of endothelial cells from TNF-α-induced apoptosis. Further, we found consumption of H2-rich water resulted in an increase in antioxidant enzyme superoxide dismutase and a decrease in thiobarbituric acid-reactive substances in whole serum and LDL. In conclusion, supplementation with H2-rich water seems to decrease serum LDL-C and apoB levels, improve dyslipidemia-injured HDL functions, and reduce oxidative stress, and it may have a beneficial role in prevention of potential metabolic syndrome.

Keywords: antioxidative property; apolipoprotein B; high density lipoprotein; low density lipoprotein.

Figures

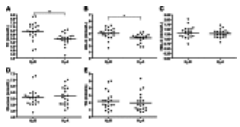

Fig. 1. Effect of H_2 on...

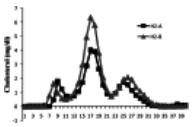

Fig. 2. FPLC cholesterol profiles using pooled...

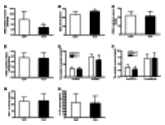

Fig. 3. Effect of H_2 on...

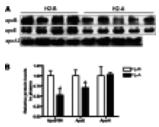

Fig. 4. Effect of H_2 on...

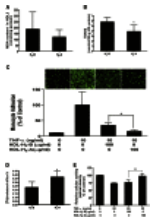

Fig. 5. H_2 seems to improve...

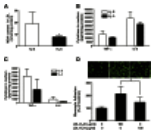

Fig. 6. H_2 seems to reduce...

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