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# Treatment with hydrogen molecule attenuates cardiac dysfunction in streptozotocin-induced diabetic mice

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## Abstract

**Introduction:** Diabetic cardiomyopathy, a disorder of the heart muscle in diabetic patients, is one of the major causes of heart failure. The aim of present study was to investigate the therapeutic effect of hydrogen molecule on streptozotocin-induced diabetic cardiomyopathy in mice.

**Methods:** Diabetes was induced in adult male mice by consecutive peritoneal injection of streptozotocin (50 mg/kg/day) for 5 days. Then, they were treated with hydrogen water (1.3±0.2 mg/l) for 8 weeks (four groups, n=83-88 in each group).

**Results:** Although treatment of diabetic mice with hydrogen water did not significantly affect blood glucose level, it significantly attenuated cardiac hypertrophy and reduced expression of atrial natriuretic factor and β-myosin heavy chain; it alleviated cardiac fibrosis and reduced expression of collagen I and III, transforming growth factor beta, alpha-smooth muscle actin, and osteopontin; it reduced cardiac caspase-3 activity and ratio of bax/bcl-2. Importantly, hydrogen water treatment improved cardiac function in streptozotocin-diabetic mice. Furthermore, it was found that hydrogen water treatment abated oxidative stress, suppressed inflammation, and attenuated endoplasmic reticulum stress in the hearts of streptozotocin-diabetic mice. In addition, hydrogen water treatment suppressed activation of Jun NH2-terminal kinase and p38 mitogen activated protein kinase signaling and nuclear factor κB signaling in the hearts of streptozotocin-diabetic mice.

**Conclusion:** Treatment with hydrogen molecule attenuated cardiac dysfunction in streptozotocin-induced diabetic mice, which was independent of glycemic control.

**Summary:** Treatment with hydrogen molecule attenuated cardiac dysfunction in streptozotocin-induced type 1 diabetic mice. Molecular hydrogen could thus be envisaged as a nutritional countermeasure for diabetic cardiomyopathy.

**Keywords:** Diabetic cardiomyopathy; Endoplasmic reticulum stress; Hydrogen molecule; Inflammation; Oxidative stress.



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