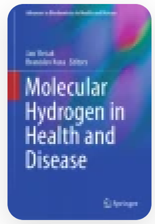

Molecular Hydrogen in Health and Disease

Molecular Hydrogen: A New Treatment Strategy of Mitochondrial Disorders

Chapter
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Abstract

Disturbances of mitochondrial function and oxidative stress are considered to be the molecular basis of the origin and development of various diseases, including mitochondrial diseases. The beneficial effect of molecular hydrogen (H_2) has been proven in the prevention and supportive therapy of patients with cardiovascular disease, Parkinson's disease, in patients with metabolic syndrome, in respiratory system disease, in oncology patients treated with radiation, in cerebral infarction, in diabetes mellitus, in rheumatoid arthritis. Exact molecular mechanisms of H_2 on mitochondrial level are not fully understood. We proposed new mechanism of the H_2 effect in mitochondrial respiratory chain function. H_2 may be a donor of both electron and proton to the Q-cycle of the mitochondrial respiratory chain and thus can preserve coenzyme Q level with the subsequent ATP production via oxidative phosphorylation. H_2 was shown to alter the direction of the electron flow of mitochondrial respiratory chain system, which depends on NAD^+/NADH ratio. We also found beneficial effect of H_2 on platelet mitochondrial bioenergy function in patients with NAFLD. The application of H_2 appears to be a new treatment strategy for targeted therapy of mitochondrial disorders.

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