

Hydrogen sulfide treatment moderates type two diabetes-mediated skeletal muscle loss

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Video Abstract

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Abstract

A recent study published in the journal *Oxidative Medicine and Cellular Longevity* suggests that the molecule hydrogen sulfide can help mitigate sarcopenia, a disease characterized by decreased muscle loss and function that often leads to disability in patients with diabetes. Type 2 diabetes is one of the biggest health and development challenges of the 21st century. Currently, 366 million people live with type 2 diabetes, and another 280 million are at high risk. By 2030, those numbers are expected to double. Diabetes is characterized by the body's ineffective use of insulin and largely results from excess body weight and physical inactivity. Several diseases are associated with diabetes, including high blood pressure, heart attack, stroke, and sarcopenia. Sarcopenia is a disease characterized by muscle loss and dysfunction leading to disability in patients with diabetes. It's well known that the symptoms associated with the development of sarcopenia can potentially be mitigated by hydrogen sulfide. Hydrogen sulfide is formed in the body and prevents oxygen levels from dipping too low. However, the mechanism of action has not yet been identified. In the recent study, researchers at the Dasman Diabetes Institute zeroed in on the molecular mechanism linking hydrogen sulfide to the reduction of sarcopenia. The team first performed a comprehensive set of tests on rats that modeled type 2 diabetes, since patients with diabetes are at higher risk of developing sarcopenia. Like humans, diabetic rats experienced reduced muscle mass and strength compared to controls, even showing a significant decrease in their muscle protein composition. Supporting evidence showed that diabetic rats had decreased levels of key regulators involved in protein synthesis, which worsened the rats' muscle condition by tipping their biochemical balance toward protein degradation. But the story isn't over. The authors also suggested that the rate of this muscle degradation increased due to lower levels of oxygen in the body. Diabetic rats showed a higher level of harmful reactive oxygen species along with significantly lower levels of hydrogen sulfide, which helps regulate those reactive oxygen species to maintain oxygen levels in the body. Providing a source of hydrogen sulfide, however, helped turn things around. The authors found that injecting sodium hydrogen sulfide into rats modeling type 2 diabetes restored muscle mass and function to almost control levels after only a month. This was supported by a decrease in the number of reactive oxygen species present in the treated rats. So, while the study does show how diabetes could lead to sarcopenia, it also introduces a new way of potentially treating the disease complications in the future.