

# Hormone MOTS-c improves metabolic dysfunction in obese mice

Su-Jeong Kim, Brendan Miller, Hemal H. Mehta, Jialin Xiao, Junxiang Wan, Thalida Em Arpawong, Kelvin Yen, Pinchas Cohen

---

## Video Abstract

**Keywords:** Physiological Reports, University of Southern California, MOTS-c, high-fat diet, metabolomics, sphingolipid, monoacylglycerol, dicarboxylate, insulin resistance, metabolic syndrome, exercise mimetic, diet-induced obesity, plasma marker, type 2 diabetes, obesity, insulin sensitivity, body weight, fatty liver, glucose utilization, ceramide

**Posted Date:** September 27th, 2019

**DOI:** <https://doi.org/10.21203/rs.2.15605/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

This small hormone found in the mitochondria is known as MOTS-c. MOTS-c is known to regulate metabolic functions throughout the body, most importantly turning glucose into usable energy. Now, new research shows that MOTS-c could help boost glucose metabolism when injected into obese mice fed a high-fat diet. The implications for humans: improved control over blood sugar levels for those with type 2 diabetes and obesity. The findings are among the latest supporting the use of MOTS-c as an exercise mimetic, a drug that stimulates biochemical changes normally activated only through exercise. In animal models of obesity and diabetes, researchers have found that certain metabolic pathways are overactivated. These include the breakdown of fats and energy sources other than glucose. The detection of products and by-products of this breakdown serve as clues that normal, healthy metabolism has gone astray. Motivated by evidence that MOTS-c lends a helping hand in normalizing these pathways, researchers investigated what the rescue hormone could do for mice with diet-induced obesity. The team injected mice with MOTS-c or water over the course of three days. They found that despite being on the same diet, mice on MOTS-c maintained lower blood sugar levels than those of mice injected with water. The result suggests that MOTS-c improves glucose regulation. The two groups of mice showed further differences in their metabolic profiles. Compared with water-injected mice, MOTS-c mice showed lower levels of S1P, a signaling lipid found in elevated amounts in people with type 2 diabetes and obesity; higher expression of fat-regulating proteins, indicating the accumulation of less fat in muscle; and reduced omega oxidation, an alternative form of energy production in the body that suggests metabolic dysfunction. Collectively, the results indicate that MOTS-c improves the efficiency with which mice can process glucose. That has positive implications for keeping fat from accumulating in muscle and for maintaining an overall healthier lifestyle. It isn't yet clear how the findings will carry over to humans, but they are promising. They echo the results of numerous other studies that report the benefits of MOTS-c for those with diabetes and/or obesity. Further evidence that MOTS-c can improve exercise capacity and metabolism could help translate this useful hormone to the clinic.