

Natural hormone molds leaner bodies in mice

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The hormone's health-promoting properties make it a promising candidate for treating obesity and other metabolic diseases, said principal investigator Bruce Spiegelman, the Stanley J. Korsmeyer Professor of Cell Biology and Medicine at Harvard Medical School. Credit: Stephanie Mitchell/Harvard Staff Photographer

A natural hormone that is increased by physical exercise and by exposure to cold improves blood sugar control, suppresses inflammation, and burns fat to mold leaner bodies in mice, report scientists at Dana-Farber Cancer Institute, a principal teaching affiliate of Harvard Medical School.

The hormone, called meteorin-like protein, or Metrnl, can be made in the laboratory. Its health-promoting properties make it a promising candidate for treating obesity and other [metabolic diseases](#), [inflammation](#), and possibly other disorders, said principal investigator Bruce Spiegelman of Dana-Farber's Cancer Biology department.

"This might have interesting therapeutic potential for several diseases," said Spiegelman, the Stanley J. Korsmeyer Professor of Cell Biology and Medicine at Harvard Medical School. "Because it targets the immune cells involved in tissue repair it will also be interesting to see if this protein affects muscle repair in certain neuromuscular diseases."

Reporting in *Cell*, the researchers said that extra Metrnl injected into mice achieved some of the same effects as exercise. It decreased their body fat by 25 percent and caused them to lose weight even on a high-fat diet. It improved their [blood sugar control](#), stimulated conversion of chemical energy to heat, and turned on anti-inflammatory genes.

The meteorin-like protein had previously been identified, but the new study is the first to reveal its role as a hormone—a biological messenger in blood—involved in metabolism and energy balance, according to the researchers. The study adds Metrnl to an emerging picture of why exercise has many healthful benefits, from weight loss to suppressing inflammation to combating metabolic diseases.

In addition, Metrnl has an important role in dialing up fat-burning to maintain core heat production in mice exposed to cold temperatures, the study revealed. The researchers said this indicates that Metrnl is part of the body's mechanism for adapting to environmental changes.

Unlike other exercise-related proteins that stimulate "thermogenesis"—burning calories to create heat—Metrnl works mainly through the immune system, rather than directly on fat cells, said

Spiegelman. The scientists found that Metrnl activates an alternative molecular pathway by which immune cells are recruited to enter fatty tissue, where they trigger the fat-burning process.

"The idea of a protein acting primarily through the [immune cells](#) in the fat is pretty amazing, at least in our view," Spiegelman said.

The Metrnl findings come two years after the Spiegelman group isolated a different [protein](#), irisin, produced in muscles by endurance as opposed to resistance exercise, which stimulates Metrnl secretion. Irisin also promotes the browning of fat to release energy and causes mice to lose weight; like Metrnl, irisin improves glucose tolerance, which helps prevent diabetes.

From the viewpoint of developing therapies, "It is a good thing to have molecules that work through different pathways," said Spiegelman. Irisin is being studied as a potential treatment for obesity and type 2 diabetes and has been licensed commercially.

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