

# Scientists unravel the molecular secret of short, intense workouts

June 5 2014

---

In the last few years, the benefits of short, intense workouts have been extolled by both researchers and exercise fans as something of a metabolic panacea capable of providing greater overall fitness, better blood sugar control and weight reduction—all of it in periods as short as seven minutes a few times a week.

Now, in a new study, scientists from the Florida campus of The Scripps Research Institute (TSRI) confirm that there is something molecularly unique about [intense exercise](#): the activation of a single protein.

The study, published recently by *The EMBO Journal*, revealed the effects of a protein known as CRTC2.

The scientists were able to show that following high-intensity exercise, which enlists the sympathetic nervous system's "fight or flight" response, CRTC2 integrates signals from two different pathways—the adrenaline pathway and the calcium pathway, to direct muscle adaptation and growth only in the contracting muscle.

Using mice genetically modified to conditionally express CRTC2, the scientists showed that molecular changes occurred that emulated exercised muscles in the absence of exercise.

"The sympathetic nervous system gets turned on during intense exercise, but many had believed it wasn't specific enough to drive specific adaptations in exercised muscle," said Michael Conkright, PhD, a TSRI

assistant professor who led the study. "Our findings show that not only does it target those specific muscles, but it improves them—the long-term benefits correlate with the intensity of the workout."

## Mobilizing Resources

In the genetically altered animal models, this resulted in a muscle size increase of approximately 15 percent. Metabolic parameters, indicating the amount of fuel available to the muscles, also increased substantially—triglycerides went up 48 percent, while glycogen supplies rose by a startling 121 percent.

In an [exercise stress test](#), the genetically altered animals improved 103 percent after the gene was activated, compared to an 8.5-percent improvement in normal animals.

"If you think of the adrenaline system as something that mobilizes resources when you encounter, say, a bear on your way to work, what we found is that the system also gets you ready for your next bear encounter," Conkright said.

The new findings open the door to a range of potential exercise enhancements.

"Nothing can supplant exercise; however, just by activating one protein, we clearly improved performance in animal models," said Staff Scientist Nelson E. Bruno, MD, PhD, the first author of the study and a member of the Conkright laboratory. "We are now searching for molecular therapeutics that will activate the CRT2 protein so that even an average [exercise](#) routine could potentially be enhanced and made more beneficial."

**More information:** "Creb Co-Activators Direct Anabolic Responses

and Enhance Performance of Skeletal Muscle,"  
[emboj.embopress.org/content/33/9/1027](https://emboj.embopress.org/content/33/9/1027)

Provided by The Scripps Research Institute

Citation: Scientists unravel the molecular secret of short, intense workouts (2014, June 5)  
retrieved 24 April 2024 from  
<https://medicalxpress.com/news/2014-06-scientists-unravel-molecular-secret-short.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.