

## **Study: 10 Minutes of Exercise Yields Hour-Long Effects**

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**Ten minutes of brisk exercise triggers metabolic changes that last at least an hour. The unfair news for panting newbies: The more fit you are, the more benefits you just might be getting.**



We all know that exercise and a good diet are important for health, protecting against heart disease and diabetes, among other conditions. But what exactly causes the health improvement from working up a sweat or from eating, say, more olive oil than saturated fat? And are some people biologically predisposed to get more benefit than others?

**They're among questions that metabolic profiling, a new field called metabolomics, aims to answer in hopes of one day optimizing those benefits — or finding patterns that may signal risk for disease and new ways to treat it.**

"We're only beginning to catalog the metabolic variability between people," says Dr. Robert Gerszten of Massachusetts General Hospital, whose team just took a step toward that goal.

The researchers measured biochemical changes in the blood of a variety of people: the healthy middle-aged, some who became short of breath with exertion, and marathon runners.

First, in 70 healthy people put on a treadmill, the team found more than 20 metabolites that change during exercise, naturally produced compounds involved in burning calories and fat and improving blood-sugar control. Some weren't known until now to be involved

with exercise. Some revved up during exercise, like those involved in processing fat. Others involved with cellular stress decreased with exercise.

Those are pretty wonky findings, a first step in a complex field. But they back today's health advice that even brief bouts of activity are good.

**"Ten minutes of exercise has at least an hour of effects on your body," says Gerszten, who found some of the metabolic changes that began after 10 minutes on the treadmill still were measurable 60 minutes after people cooled down.**

Your heart rate rapidly drops back to normal when you quit moving, usually in 10 minutes or so. So finding lingering biochemical changes offers what Gerszten calls "tantalizing evidence" of how exercise may be building up longer-term benefits.

Back to the blood. Thinner people had greater increases in a metabolite named niacinamide, a nutrient byproduct that's involved in blood-sugar control, the team from Mass General and the Broad Institute of MIT and Harvard reported last week in the journal *Science Translational Medicine*.

**Checking a metabolite of fat breakdown, the team found people who were more fit — as measured by oxygen intake during exercise — appeared to be burning more fat than the less fit, or than people with shortness of breath, a possible symptom of heart disease.**

**The extremely fit — 25 Boston Marathon runners — had ten-fold increases in that metabolite after the race. Still other differences in metabolites allowed the researchers to tell which runners had finished in under four hours and which weren't as speedy.**

**"We have a chemical snapshot of what the more fit person looks like. Now we have to see if making someone's metabolism look like that snapshot, whether or not that's going to improve their performance,"** says Gerszten, whose ultimate goal is better cardiac care.

Don't expect a pill ever to substitute for a workout — the new work shows how complicated the body's response to exercise is, says metabolomics researcher Dr. Debbie Muoio of Duke University Medical Center.

But scientists are hunting nutritional compounds that might help tweak metabolic processes in specific ways. For example, Muoio discovered the muscles of diabetic animals lack enough of a metabolite named carnitine, and that feeding them more improved their control of blood sugar. Now, Muoio is beginning a pilot study in 25 older adults with pre-diabetes to see if carnitine supplements might work similarly in people who lack enough.



Next up: With University of Vermont researchers, she's testing how metabolic changes correlate with health measures in a study of people who alternate between a carefully controlled Mediterranean diet and higher-fat diets.

"The longterm hope is you could use this in making our way toward personalized medicine," Muoio says.

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