

Are you metabolically flexible? Your New Year's resolutions may depend on it

December 27 2017, by Lisa Marshall



Inigo San Millan conducts a metabolic flexibility test. Credit: University of Colorado at Boulder

Looking to fend off obesity, diabetes, heart disease or other chronic ailments in the new year? Before you hastily cut out carbs, slash the fat or sign up for the next Biggest Loser-esque workout plan, consider asking yourself: "How metabolically flexible are you?"

Metabolic flexibility is the ability for your body to quickly switch back and forth between fat and carbohydrates, efficiently using whatever fuel sources you throw at it, explains Inigo San Millan, director of the Sports Performance Program at the University of Colorado Sports Medicine Center on the Boulder campus and developer of a new non-invasive method for assessing metabolic flexibility.

"If you're not metabolically flexible, you'll have a hard time burning fats or sugars, and that can set you up for disease. If you are, you can enjoy the pleasures of a wide variety of foods and be healthy."

Get your 'metabolic rehab' on

A former pro cyclist and physiologist to many elite and pro athletes, San Millan has spent years using high-tech metabolic tests to gauge the metabolic flexibility of the fittest of the fittest. Now, he's applying a streamlined version of that [test](#) to everyday people wishing to assess their risk of cardio-metabolic diseases and get a customized exercise prescription to fend them off. He calls it "metabolic rehabilitation."

Come 2018, the test will be covered by some insurance companies, a change which San Millan hopes will nudge [primary care physicians](#) to use it with patients to assess their diabetes risk years before a glucose tolerance test could detect it.

He's also working to commercialize a streamlined, portable version of the test—even a smartphone app, which would enable consumers to use one drop of blood to test their metabolic flexibility.

"We want to bring this to the masses."

How the test works

Today, the test goes like this: Patients come to his lab, hop on a bike or treadmill and begin to pedal, run or briskly walk while wearing a mask that measures how efficiently they utilize fat and carbohydrates. Gradually, San Millan increases the resistance to see how the body reacts. He also takes periodic blood samples from the fingertip to assess how quickly the cells are clearing lactate, a metabolic byproduct that can stiffen muscles and promote disease when it accumulates.

The end result is a snapshot of the health of the patient's mitochondria—the tiny furnaces inside cells that burn through fat, carbohydrates and lactate.

The more mitochondria, the larger they are, the more metabolically flexible you are.

While elite athletes have the healthiest mitochondria, Type 2 diabetics tend to have the worst.

"The only other way to test for [mitochondrial function](#) is to do a muscle biopsy, and that's not practical," says San Millan, who published a pivotal study in the journal *Sports Medicine* in June, confirming that his test is an accurate, indirect way to measure mitochondrial health.

San Millan notes that while carbohydrates tend to be maligned as the root of metabolic disease, elite athletes have diets that consist of 70 to 80 percent or more of carbohydrates, yet they are the only population in the world free of acquired Type 2 diabetes.

Can carbs be friends?

"Carbs are not the enemy," says San Millan, also an assistant professor of Physical Medicine and Rehabilitation at the CU School of Medicine.

"Metabolic inflexibility is the enemy."

How do you know if you're metabolically inflexible? Short of having the test, people can take a hard look at their energy levels and weight patterns: Low energy, trouble losing weight regardless of dietary changes and increased blood-sugar levels can be sure signs of unhealthy mitochondria.

How does one fix that?

"The only medication that increases mitochondrial function is exercise," says San Millan. "But it has to be at the right intensity."

For a sedentary person, a one-hour walk four days a week is enough to jump start mitochondrial health. (A shorter workout may not be enough. A longer workout could elicit better results but, if done too soon, can lead to fatigue or overtraining.)

The more fit a person gets, the more freely a person can eat, he says.

The test worked for Elizabeth Wolfert, who kicked off 2016 with a visit to San Millan's lab with her mother. Their tests revealed, while her mother's mitochondrial health was relatively good, her own was surprisingly poor. She was also pre-diabetic.

One year later, after following San Millan's plan, she retested. Her pre-diabetes is gone, and her metabolism is far more flexible.

"I found it really fascinating to find out what was going on inside my own mitochondria and walk away with a program that wasn't just based on diet or exercise but on making my metabolism more flexible."

More information: Iñigo San-Millán et al. Assessment of Metabolic Flexibility by Means of Measuring Blood Lactate, Fat, and Carbohydrate Oxidation Responses to Exercise in Professional Endurance Athletes and Less-Fit Individuals, *Sports Medicine* (2017). [DOI: 10.1007/s40279-017-0751-x](https://doi.org/10.1007/s40279-017-0751-x)

Provided by University of Colorado at Boulder

Citation: Are you metabolically flexible? Your New Year's resolutions may depend on it (2017, December 27) retrieved 27 April 2024 from <https://medicalxpress.com/news/2017-12-metabolically-flexible-year-resolutions.html>

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