

Eat fat to burn fat and push through

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Will O'Connor (right) investigated the effects of eating a high carbohydrate or high fat diet on athlete performance.

Research from Massey University's School of Sport and Exercise Science has revealed changing what athletes eat can actually change the ability of their muscles to burn different fuels – findings that could help everyday people improve their body composition.

PhD student Will O'Connor investigated whether it was possible to "force adaptation" in a group of ultra-endurance [athletes](#) (those that participate in sporting events lasting four hours or more). This ability, termed metabolic flexibility, is the ideal for an athlete because, theoretically, their [body](#) is able to use different fuel sources for different exercise intensities. Generally speaking, this means using [fat](#) for longer duration, less intense exercise and conserving carbohydrate for shorter, high-intensity bouts.

In his own life as a competitive triathlete, Mr O'Connor had noticed that his mood, performance and body composition improved when he restricted his [carbohydrate intake](#). Scientifically, there was evidence that the body compensated for the limited carbohydrate in the [diet](#) by burning more fats instead.

Participants in the study were restricted to 2g of carbohydrate per kilogram of body weight per day for four weeks, with an emphasis on eating fat instead. For example, a typical day would consist of coffee with cream, eggs with bacon, limited fruit, meat and a high volume of vegetables.

They were then tested in a four hour cycle test where their respiratory exchange ratio, the ratio of oxygen and carbon dioxide inhaled and exhaled during the test, was measured. This allowed Mr O'Connor to analyse what the body was using as an energy source.

He found when athletes had been eating a low carbohydrate, high fat, diet they were burning more fat during exercise.

For athletes, this meant they were more metabolically efficient, had a greater ability to carry oxygen to their muscles and were able to mentally push through an endurance event because of fuel availability.

"The body can only store so much carbohydrate in the liver or in the muscles. If the body's relying on carbs during exercise, these stores get used up quickly and that's when athletes hit the wall"

His research also pushed the boundaries of some of the previous assumptions in sports science. Previous estimates of an athlete's fat-burning ability peaked at 1g per minute but Mr O'Connor had measurements of up to 1.97g per minute.

Research has implications for everyday people

Although his interest was in competitive athletes, Mr O'Connor says his findings are useful for the average person as well.

"This research shows that changing your diet can totally change how your body runs. You can literally increase your fitness by changing your diet.

"We also noted drastic changes in [body composition](#), or [body fat percentage](#). When you're eating a high [carbohydrate](#) diet, particularly if you're eating a lot of sugar, your insulin levels can spike. Insulin causes the body to store fat and also stop it from burning fat while it deals to the sugar. This causes the 'energy crash' that people experience and means you're putting on more fat."

The most surprising element of the research however, was high-trained athletes' ability to be efficient enough, regardless of which diet they were on.

"They were definitely better on a low-carb diet, getting to about 90% efficiency but what surprised me is that some were still getting to about 70% efficiency even on the normal-carb diet, which is still very good.

But these guys have done large amounts of endurance training which is what makes them able to endure. It really shows how amazing and adaptable the body is."

Provided by Massey University

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