A miracle molecule hiding in milk (w/ Video)

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(Phys.org) -- A Lausanne-based research team has identified a molecule naturally present in milk and other foods, nicotinamide riboside, that has extraordinary health benefits. Their findings indicate it could play an important role in preventing weight gain and diabetes and improving muscular performance.

Many natural foods, including milk and perhaps even beer, contain a molecule whose effects on metabolism are nothing short of astonishing. In an article making the cover story of today's Cell Metabolism journal, Johan Auwerx, head of EPFL's Laboratory of Integrative Systems Physiology (LISP) and holder of EPFL's Nestlé Chair in Energy Metabolism, describes a series of experiments done using nicotinamide riboside (NR), a molecule that, although known to indirectly influence the activity of mitochondria, the "powerhouses" of the cell, has been little studied up to this point.

Auwerx's team worked with the laboratory of Anthony Sauve at Cornell University's Weill Cornell Medical College in New York City to study the role of NR in closer detail. The first challenge was to obtain the molecule, which is complicated and expensive to synthesize. The researchers then measured its effects in vivo using mice. The results were impressive. NR appears to play a role in:

Preventing obesity. Mice on a high-fat diet fed NR gained significantly less weight (60%) than mice eating the same diet, but without NR supplementation. In addition, none of the NR-treated mice had indications that they were developing diabetes, unlike the untreated

mice. “Even with a normal diet, NR improves insulin sensitivity,” explains Carles Cantó, first author on the article.

Increasing muscular performance. Mice who were fed supplements containing NR over a ten week period had better endurance performance than those who didn’t receive the supplements. They were in better shape – and this was confirmed by observations of their muscle fibers under the microscope.

Improving energy expenditure. After eight weeks of a normal diet supplemented with NR, the mice demonstrated better thermal resistance in an air-conditioned environment.

The scientists hypothesize that these effects are the result of an improvement in mitochondrial function. Upon further investigation, they were able to show that supplementing with NR indirectly stimulated the activity of sirtuin enzymes. These enzymes improve metabolic functions associated with mitochondria, such as lipid combustion and cellular oxidative capacities. “Our previous research involved genetically altering the “brake” on sirtuin activity. This research does the opposite; here we can put the pedal to the floor!” says Auwerx.

Some of the effects of aging are also thwarted by an improvement in mitochondrial function. Many of an organism’s functions slow down as mitochondrial activity wanes; by stimulating mitochondria with NR, the researchers think they may be able to improve health and perhaps even increase longevity. Trials underway on nematodes seem to bear this out. “This substance acts upon a wide spectrum of living things, from yeasts and worms all the way up to mammals,” adds Cantó.

No side effects

These beneficial effects aren’t the only advantages of this “hidden

vitamin." The fact that it is naturally present in many foods will make it significantly easier for the public to accept its use in a nutritional or therapeutic context. In addition, "despite all our efforts, we were not able to detect side effects," says Cantó. Even in quantities ten times over the "effective" dose, no adverse reactions were observed. "It really appears that cells use what they need when they need it, and the rest is set aside without being transformed into any kind of deleterious form," explains the scientist. On that count, if used to improve cholesterol profiles, NR would have a decisive advantage over its "cousin" NA (nicotinic acid, or niacin), which is as effective, but has various side effects such as flushing.

This research will certainly have widespread implications in nutrition, health care and the development of "alicaments." "Other laboratories, as well as companies that can synthesize or extract this molecule, first need to show an interest in it," says Auwerx. He was able to detect NR in milk, and suspects that it is also present in other common foods. "But at the moment, we can't even measure its concentration in milk," he cautions. "So it's impossible to know how much you would have to drink to be able to observe its effects."

A new field of research is opening with this "hidden vitamin in milk," which will be of interest to doctors, nutritionists and athletes as well as synthetic vitamin manufacturers. The work is just beginning, but "now we know why mothers are right when they tell their kids to drink their milk!" quips Auwerx.

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