

Apple peel compound boosts calorie burning, reduces obesity in mice

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Obesity and its associated problems such as diabetes and fatty liver disease are increasingly common global health concerns. A new study by University of Iowa researchers shows that a natural substance found in apple peel can partially protect mice from obesity and some of its harmful effects.

The findings suggest that the substance known as ursolic acid reduces obesity and its associated health problems by increasing the amount of muscle and brown fat, two tissues recognized for their calorie-burning properties.

The study, which was published June 20 in the journal [PLoS ONE](#), was led by Christopher Adams, M.D., Ph.D., UI associate professor of [internal medicine](#) and a Faculty Scholar at the Fraternal Order of Eagles Diabetes Research Center at the UI.

"From previous work, we knew that ursolic acid increases muscle mass and strength in healthy mice, which is important because it might suggest a potential therapy for muscle wasting," Adams says. "In this study, we tested ursolic acid in mice on a high-fat diet -- a [mouse model](#) of obesity and [metabolic syndrome](#). Once again, ursolic acid increased skeletal muscle. Interestingly, it also reduced obesity, pre-diabetes and [fatty liver disease](#).

"Since muscle is very good at [burning calories](#), the increased muscle in ursolic acid-treated mice may be sufficient to explain how ursolic acid

reduces obesity. However, we were surprised to find that ursolic acid also increased brown fat, a fantastic calorie burner. This increase in brown fat may also help protect against obesity."

Until quite recently, researchers believed that only infants had brown fat, which then disappeared during childhood. However, improved imaging techniques have shown that adults do retain a very small amount of the substance mostly in the neck and between the shoulder blades. Some studies have linked increased levels of brown fat with lower levels of obesity and healthier levels of blood sugar and [blood lipid](#), leading to the suggestion that brown fat may be helpful in preventing obesity and diabetes.

The UI team, which also included Steven Kunkel, Christopher Elmore, Kale Bongers, Scott Ebert, Daniel Fox, Michael Dyle, and Steven Bullard, studied mice on a high-fat diet over a period of several weeks. Half of the animals also received ursolic acid in their high-fat food. Interestingly, mice whose diet included ursolic acid actually ate more food than mice not getting the supplement, and there was no difference in activity between the two groups. Despite this, the ursolic acid-treated mice gained less weight and their blood sugar level remained near normal. Ursolic acid-treated mice also failed to develop obesity-related fatty liver disease, a common and currently untreatable condition that affects about one in five American adults.

Further study showed that ursolic acid consumption increased skeletal muscle, increasing the animals' strength and endurance, and also boosted the amount of brown fat. Because both muscle and brown fat burn calories, the researchers investigated energy expenditure in the mice and showed that ursolic acid-fed mice burned more calories than mice that didn't get the supplement.

"Our study suggests that ursolic acid increases [skeletal muscle](#) and brown

fat leading to increased calorie burning, which in turn protects against diet-induced obesity, pre-diabetes and fatty liver disease," Adams says. "Brown fat is beneficial and people are trying to figure out ways to increase it. At this point, we don't know how ursolic acid increases brown fat, or if it increases brown fat in healthy mice. And, most importantly, we don't know if ursolic acid will benefit people. Our next step is to determine if ursolic acid can help patients."

More information: [dx.plos.org/10.1371/journal.pone.0039332](https://doi.org/10.1371/journal.pone.0039332)

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