Resveratrol prevents fat accumulation in livers of 'alcoholic' mice

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The accumulation of fat in the liver as a result of chronic alcohol consumption could be prevented by consuming resveratrol, according to a new study with mice. The research found that resveratrol reduced the amount of fat produced in the liver of mice fed alcohol and, at the same time, increased the rate at which fat within the liver is broken down.

Chronic alcohol consumption causes fat to accumulate and can lead to liver diseases, including cirrhosis and fibrosis of the liver. It can also result in liver failure. The study points to resveratrol as a possible treatment for alcoholic fatty liver disease, and as a way to prevent the disease in those who are at risk, but have not developed it.

Resveratrol is present in grapes, peanuts, berries and in red wine. Other research with mice has suggested resveratrol may have anti-cancer and anti-inflammatory properties. There is also evidence that it has cardiovascular benefits. However, these findings have not been extended to humans.

The study, "Resveratrol alleviates alcoholic fatty liver in mice," was carried out by Joanne M. Ajmo, Xiaomei Liang, Christopher Q. Rogers, Brandi Pennock and Min You, all of the University of South Florida Health Sciences Center, Tampa. The study appears in the American Journal of Physiology-Gastrointestinal and Liver Physiology, published by The American Physiological Society.

Activates cell signalers

The study builds on previous research, which suggests that alcohol inhibits two molecules that play a role in cell signaling and the breakdown of fats in the liver: AMP-activated protein kinase (AMPK) and sirtuin 1 (SIRT1). When alcohol inactivates AMPK and SIRT1, it allows fat to accumulate. Resveratrol does the opposite -- activating AMPK and SIRT1, and helping to clear out fat.

In this study, the authors wanted to find out more about how this happens, at the molecular level. They divided mice into groups and fed all of them a low-fat diet. Some mice had resveratrol in their diet, some had resveratrol plus ethanol (alcohol), some had ethanol alone and some had neither ethanol nor resveratrol. The researchers used two different dose levels of resveratrol. At the end of the experiment, they examined the livers of the mice.

The researchers found, as they had expected, that resveratrol treatment increased the expression of SIRT1 and stimulated the activity of AMPK in the livers of mice fed alcohol. They further found that the increased expression of SIRT1 and AMPK led to:

-- Reduction of sterol regulatory element binding protein (SREBP-1)
-- Activation of peroxisome proliferator-activated receptor gamma co-activator alpha (PGC-1α)
-- Elevation of circulating adiponectin, a hormone produced by fat cells, which helps control obesity
-- Enhanced expression of adiponectin receptors in the liver, which increases the effectiveness of the circulating adiponectin.

The findings suggest that resveratrol prevents alcoholic fatty liver by coordinating molecules that control fat metabolism. This prevents accumulation of fat in the mouse liver by both reducing the production

of fat and burning off the fat that is there. Interestingly, the combination of alcohol with resveratrol appears to enhance the positive effects of resveratrol, said Dr. You, the study's senior author.

"Our study suggests that resveratrol may serve as a promising agent for preventing or treating human alcoholic fatty liver disease," the authors concluded.

Source: American Physiological Society