UT SOUTHWESTERN MEDICAL CENTER NEWS

Media Contact: Kristen Holland Shear
214-648-3404
kristen.hollandshear@utsouthwestern.edu

Limiting fructose may boost weight loss, UT Southwestern researcher reports

DALLAS – July 24, 2008 – One of the reasons people on low-carbohydrate diets may lose weight is that they reduce their intake of fructose, a type of sugar that can be made into body fat quickly, according to a researcher at UT Southwestern Medical Center.

Dr. Elizabeth Parks, associate professor of clinical nutrition and lead author of a study appearing in a current issue of the *Journal of Nutrition,* said her team's findings suggest that the right type of carbohydrates a person eats may be just as important in weight control as the number of calories a person eats.

Current health guidelines suggest that limiting processed carbohydrates, many of which contain high-fructose corn syrup, may help prevent weight gain, and the new data on fructose clearly support this recommendation.

"Our study shows for the first time the surprising speed with which humans make body fat from fructose," Dr. Parks said. Fructose, glucose and sucrose, which is a mixture of fructose and glucose, are all forms of sugar but are metabolized differently.

"All three can be made into triglycerides, a form of body fat; however, once you start the process of fat synthesis from fructose, it's hard to slow it down," she said.

In humans, triglycerides are predominantly formed in the liver, which acts like a traffic cop to coordinate the use of dietary sugars. It is the liver's job, when it encounters glucose, to decide whether the body needs to store the glucose as glycogen, burn it for energy or turn the glucose into triglycerides. When there's a lot of glucose to process, it is put aside to process later.

Fructose, on the other hand, enters this metabolic pathway downstream, bypassing the traffic cop and flooding the metabolic pathway.

"It's basically sneaking into the rock concert through the fence," Dr. Parks said. "It's a less-controlled movement of fructose through these pathways that causes it to contribute to greater triglyceride synthesis. The bottom line of this study is that fructose very quickly gets made into fat in the body."

Though fructose, a monosaccharide, or simple sugar, is naturally found in high levels in fruit, it is also added to many processed foods. Fructose is perhaps best known for its presence in the sweetener called high-fructose corn syrup or HFCS, which is typically 55 percent fructose and 45 percent glucose, similar to the mix that can be found in fruits. It has become the preferred sweetener for many food manufacturers because it is generally cheaper, sweeter and easier to blend into beverages than table sugar.

For the study, six healthy individuals performed three different tests in which they had to consume a fruit drink formulation. In one test, the breakfast drink was 100 percent glucose, similar to the liquid

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doctors give patients to test for diabetes – the oral glucose tolerance test. In the second test, they drank half glucose and half fructose, and in the third, they drank 25 percent glucose and 75 percent fructose. The tests were random and blinded, and the subjects ate a regular lunch about four hours later.

The researchers found that lipogenesis, the process by which sugars are turned into body fat, increased significantly when as little as half the glucose was replaced with fructose. Fructose given at breakfast also changed the way the body handled the food eaten at lunch. After fructose consumption, the liver increased the storage of lunch fats that might have been used for other purposes.

"The message from this study is powerful because body fat synthesis was measured immediately after the sweet drinks were consumed," Dr. Parks said. "The carbohydrates came into the body as sugars, the liver took the molecules apart like tinker toys, and put them back together to build fats. All this happened within four hours after the fructose drink. As a result, when the next meal was eaten, the lunch fat was more likely to be stored than burned.

"This is an underestimate of the effect of fructose because these individuals consumed the drinks while fasting and because the subjects were healthy, lean and could presumably process the fructose pretty quickly. Fat synthesis from sugars may be worse in people who are overweight or obese because this process may be already revved up."

Dr. Parks said that people trying to lose weight shouldn't eliminate fruit from their diets but that limiting processed foods containing the sugar may help.

"There are lots of people out there who want to demonize fructose as the cause of the obesity epidemic," she said. "I think it may be a contributor, but it's not the only problem. Americans are eating too many calories for their activity level. We're overeating fat, we're overeating protein; and we're overeating all sugars."

Some data were collected at the University of Minnesota, where Dr. Parks worked before joining the UT Southwestern faculty in 2006.

The work was supported by the National Institutes of Health, the Cargill Higher Education Fund and the Sugar Association.

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