MedicalXpress

Gut metabolism changes—not stomach size—linked to success of vertical sleeve gastrectomy

March 26 2014

It's not the size of the stomach that causes weight loss after a specific type of bariatric surgery, but rather a change in the gut metabolism, say researchers from the University of Cincinnati (UC), the University of Gothenburg in Sweden and Cincinnati Children's Hospital Medical Center.

The scientists, publishing their results in the March 26, 2014, advanced online edition of *Nature*, have found that following vertical sleeve gastrectomy, there is a change in bile acids that bind to a nuclear receptor called FXR. In the absence of FXR, the researchers showed, weight-loss success and improvement in diabetes from vertical sleeve gastrectomy is reduced.

Vertical sleeve gastrectomy, VSG, is a bariatric procedure in which approximately 80 percent of the stomach is removed to create a gastric "sleeve," which imposes a physical restriction on the amount of food that can be consumed at one time.

"There are very large debates over how small to make the sleeve," says co-principal investigator Randy Seeley, PhD, professor in the endocrinology, diabetes and metabolism division at UC and director of the Cincinnati Diabetes and Obesity Center. "Conventional thought is when you make the stomach smaller, patients lose more weight because they have less room to put more food and, therefore, eat fewer calories.

But as it turns out, the reason why the surgery works is that you are changing the bile acids."

This study, Seeley says, is the first empirical evidence that the therapeutic value of VSG is not a result of the mechanical restriction of a smaller stomach, but the result of increased circulating bile acids that are known to bind to the nuclear receptor FXR.

That discovery, he says, was made in a mouse model by removing the FXR receptor in obese mice that had undergone VSG. Despite having a smaller pouch, or "sleeve," Seeley says, rodents without the FXR receptor didn't lose weight.

Because bile acids and FXR receptors interact with gut microbial communities, the researchers also looked at gut bacteria after VSG. They found that the surgery also results in changes in the gut bacteria.

"Importantly, we observed changes in several key bacterial groups that have been previously linked to the risk of Type 2 diabetes, and these changes were related to FXR and bile acids," says Karen Ryan, PhD, lead author and assistant professor of endocrinology, diabetes and metabolism at UC.

"Manipulating the gut bacteria is another way we think that we might be able to mimic how surgery works without having to do the cutting and stapling," Seeley says.

The significance of this study is in the exploration of future treatments for obesity and Type 2 diabetes, as bariatric surgery is proven to provide substantial improvements in obesity and obesity-related conditions.

"There are not enough surgery tables or surgeons to treat the obesity epidemic, so we need to understand how bariatric surgery works so that

we can offer more scalable solutions," Seeley says.

More information: Paper: dx.doi.org/10.1038/nature13135

Provided by University of Cincinnati