

washingtonpost.com

Research Links Obesity to Mix of Bacteria in Digestive Tract

By Rob Stein
Washington Post Staff Writer
Thursday, December 21, 2006; A12

Obese people have a distinctive mix of bacteria in their digestive systems that seems to make them prone to gaining weight, a startling discovery that could lead to new ways to fight the obesity epidemic, researchers reported yesterday.

Obese people have more digestive microbes that are especially efficient at extracting calories from food, the researchers said, and the proportion of these super-digesting organisms ebbs as the people lose weight. Moreover, when the scientists transplanted these bacteria from obese mice into lean mice, the thin animals start getting fat. This provides more support for the provocative theory that the bacteria that populate the intestine play an important role in regulating weight.

"There appears to be a link between obesity and the type of bugs in your gut," said Jeffrey I. Gordon of Washington University School of Medicine in St. Louis, who led the series of experiments being published in today's issue of the journal *Nature*. "The difference in the structure of microbial ecology of our gut may set us up for susceptibility to obesity."

Gordon and his colleagues stressed that more work is needed to explore the findings. And they cautioned against trying to manipulate "gut flora" with antibiotics or microbial "probiotic" pills sold in health-food stores. But if the findings are confirmed and better understood, they could lead to profound new insights into one of the nation's biggest health problems, the researchers said.

"In the future, we could potentially manipulate the structure and function of these microbial societies as a new approach toward preventing and treating obesity," Gordon said.

The findings produced enthusiasm and caution from other researchers. Some praised the work for possibly offering a long-sought alternative explanation for the obesity epidemic. Perhaps some change, such as a food additive or antibiotic use, has caused a fundamental shift in gut flora, making it easier for many people to gain weight.

"This is very exciting," said Barbara Corkey, an obesity researcher at Boston University. "We don't know why the obesity epidemic is happening. People say it's because of gluttony and sloth. I think there must be something else. It's exciting to see some work being done on alternative explanations."

Others suspect that if gut microbes do play a role, it is a minor one.

"This is extremely interesting," said Hans-Rudolf Berthoud of the Pennington Biomedical Research Center

Advertisement



The advertisement features the Circuit City logo in a red circle on the left. To the right, two digital cameras are displayed: a larger black DSLR camera and a smaller silver compact camera. Below the cameras, the text reads "find the perfect digital camera" in red, with a red "shop now" button containing a white arrow pointing right.

in Baton Rouge. "But lifestyle and the environment are still the major factors in the obesity epidemic."

On a broader level, the findings highlight the symbiotic relationship humans maintain with the trillions of microorganisms that populate our bodies, Gordon and others said.

"This strengthens the notion that the indigenous organisms in the human body are probably intimately involved in our health," said David A. Relman of Stanford University. "The ways they are involved remain unclear, but this underscores the idea that it behooves us to figure it out."

Scientists have long known that the human body is teeming with germs, primarily bacteria, which cover the skin and inhabit every orifice. By some estimates only one out of every 10 cells in the human body is human. These organisms perform a host of functions, especially in the digestive tract, where they help digest food.

"There's growing interest in the idea that humans are more than just human cells," said Martin Jack Blaser of New York University. "These cells are not just passengers. They are part of the human metabolism."

To explore the role of the organisms in weight regulation, Gordon's team first compared the gut flora of 12 obese people to lean subjects'. The obese tended to have a significantly greater proportion of one of the two main types of bacteria found in the gut, known as Firmicutes, than the other, known as Bacteroidetes.

Next, the researchers spent a year meticulously measuring the gut flora of the obese volunteers as they tried to lose weight by eating low-calorie diets that restricted either their fat or carbohydrate intake. As volunteers lost weight, the proportion of Firmicutes in their digestive tracts fell and the proportion of Bacteroidetes rose, the researchers found.

When the researchers conducted detailed molecular analyses of the two types of bacteria in the laboratory, they discovered the Firmicutes were much better at extracting calories from food.

Moreover, when the researchers examined the gut flora of obese laboratory mice, they found a similar pattern in their ratios of Firmicutes to Bacteroidetes. And when researchers transferred gut flora from obese mice to mice devoid of gut flora, the recipient animals tended to gain weight, confirming that the pattern was associated with weight gain.

"This attribute of being able to harvest and store more energy appeared to be transmissible," Gordon said. "For the first time, we see that there is a correlation between the microbial gut ecology and the obese state."

Among other things, the findings could help explain why it becomes harder and harder to lose weight as people get fat, Gordon said.

"That's part of the pathology of obesity. When you shift the amount of fat tissue, the amount of energy you can harvest becomes somewhat greater, and that's going to fuel the obese state," he said.

The researchers acknowledged that the difference in the number of calories extracted by the microbes is relatively small. But over time even a small differential could be significant, they said.

Many questions remain, however. It is unclear what determines the make-up of a person's gut flora. It might be the microbes they pick up from their mothers; it might be their exposure to antibiotics. It is also unclear how fat tissue and gut flora might affect one another, and whether the change in gut bacteria causes or is a

result of the weight loss.

Despite those and other questions, scientists said the findings are sure to inspire more investigation.

"They open up a completely new hypothesis," said Randy Seeley, an obesity researcher at the University of Cincinnati who wrote a commentary accompanying the research. "There are a lot of hurdles here that we have to deal with in terms of our basic understanding. But it's fascinating."

© 2006 The Washington Post Company

Ads by Google

[Neulasta® \(pegfilgrastim\)](#)

Be proactive. Protect yourself right from the start of chemo.

www.Neulasta.com