

# Researchers examine link between bacteria in the digestive system and obesity

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Obesity is more than a cosmetic concern because it increases a person's risk for developing high blood pressure, diabetes and many other serious health problems. It's well understood that consuming more calories than you expend through exercise and daily activities causes weight gain. But with about one in every three American adults now considered obese, researchers are attempting to identify additional factors that affect a person's tendency to gain and retain excess weight.

In the April issue of *Mayo Clinic Proceedings*, researchers from Mayo Clinic Arizona and Arizona State University examine the role that bacteria in the human gastrointestinal tract play in regulating weight and the development of obesity.

Known as gut microbiota, the trillions of bacteria that populate the human gastrointestinal tract perform a variety of chores. These "friendly" microbes help extract calories from what we eat, help store these calories for later use, and provide energy and nutrients for the production of new bacteria to continue this work.

According to John DiBaise, M.D., a Mayo Clinic Arizona gastroenterologist and lead author of the *Mayo Clinic Proceedings* article, several animal studies suggest that gut microbiota are involved in regulating weight and that modifying these bacteria could one day be a treatment option for obesity.

One study cited by the authors observed that young, conventionally-

reared mice have a significantly higher body fat content than a laboratory-bred, germ-free strain of mice that lack these bacteria, even though they consumed less food than their germ-free counterparts. When the same research group transplanted gut microbiota from normal mice into germ-free mice, the germ-free mice experienced a 60 percent increase in body fat within two weeks, without any increase in food consumption or obvious differences in energy expenditure.

Another animal study reviewed by the authors focused on the gene content of the gut microbiota in mice. Finding more end products of fermentation and fewer calories in the feces of obese mice led researchers to speculate that the gut microbiota in the obese mice help extract additional calories from ingested food.

“These results suggest that differences exist in the gut microbiota of obese versus lean mice, raising the possibility that the manipulation of gut microbiota could be a useful strategy for regulating energy balance in obese people,” says Dr. DiBaise.

Although information on the link between gut microbiota and obesity in human subjects is more limited, the authors present some evidence supporting this connection. One study cited placed 12 obese participants in a weight-loss program for a year, randomly assigning them to either a fat-restricted or carbohydrate-restricted, low-calorie diet. Researchers noted distinct differences between lean and obese participants when they monitored the type and number of bacteria found in participants’ stool samples before and after the diet changes.

Another study cited followed children from birth to age 7 and analyzed stool samples collected at 6 and 12 months. The children who were normal weight at age 7 had distinctly different bacteria in their samples from those collected from overweight-obese children, suggesting that differences in the composition of the gut microbiota precede overweight-

obesity.

Dr. DiBaise says that much more research is needed to clarify a number of issues related to the relationship between the gut microbiota and obesity. Future studies need to establish whether the small changes in caloric extraction seen in recent studies can produce measurable weight differences in humans. Second, researchers need to prove or disprove the possible relationship between the gut microbiota and the regulation of weight.

“In particular, it is essential to demonstrate unequivocally whether differences in gut microbiota in obese versus lean people are the cause or the result of obesity,” says Dr. DiBaise.

Finally, the authors note that the next wave of research should explore the safety and feasibility of modifying the gut microbiota in clinical trials involving humans.

“Although clearly no substitute for proper diet and exercise, manipulation of the gut microbiota may represent a novel approach for treating obesity that has few adverse effects,” says Dr. DiBaise.

Source: Mayo Clinic

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