FOOD PRODUCT DESIGN

Probiotics Affect Metabolism

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ST. LOUIS—Scientists at Washington University School of Medicine have demonstrated a way to test the effects of probiotic bacteria on digestive health by zeroing in on the community of microbes that naturally live in the intestine and help to digest foods the body can't on its own.

The study, published in the Oct. 26 issue of ***Science Translational Medicine***, establishes a way to understand more fully the complex relationship that exists between diet and the way the gut microbiome operates to digest particular foods.

"Now, we can directly test the influence of existing or candidate probiotics on the ability of our gut microbial community to digest various components of our diets," says senior author Jeffrey I. Gordon, M.D., the Dr. Robert J. Glaser Distinguished University Professor and director of the Center for Genome Sciences & Systems Biology. "Our group's goal is to help develop new ways to improve the nutritional value of the foods we consume, in part by optimizing the features contained in the gut microbial communities of people at various stages of life and from different cultural traditions."

The researchers investigated the way a yogurt (supplied by Danone) influenced intestinal microbes in people and in mice that were raised under sterile conditions and seeded with a model community of human gut microbes.

They first tested the effects of the yogurt on the gut microbial communities of seven pairs of healthy adult identical twins—all females—who ate two servings daily for seven weeks. The yogurt, with its five live bacterial strains, did not disturb the mix of microbes in the women's digestive tracts. A repeated analysis of stool samples taken in the weeks before, during and after the yogurt was consumed showed that the various microbial species and their genes present in the women's intestines remained remarkably stable. Within two weeks after the women stopped eating the yogurt, no live bacteria from the yogurt could be detected in their intestines.

The researchers then compared their results in humans with those in mice that had been transplanted with a model community of 15 prominent human intestinal microbes, in which each of the microbes' genomes had been sequenced. When the mice were fed the same yogurt strains, the mix of human microbes and the content of their 58,000 human microbial genes did not change appreciably.

By analyzing the expression of genes in the human intestinal microbes of these mice, along with metabolites in their urine, the researchers found the yogurt strains elicited key changes in a number of metabolic pathways, particularly those related to the processing of carbohydrates in the diet. Many of the changes in metabolism first detected in the mice also were found to occur in the twins.

"Carbohydrates are an important part of our diet, and the way they are broken down by gut microbes is an important part of digestive health," Gordon said. "A number of carbohydrates are quite complex and can only be digested by enzymes made by gut microbes. We found that when the mice were given the bacterial strains found in the yogurt, at doses comparable to those consumed by humans, they could more efficiently break down certain classes of carbohydrates."

Sources:

Washington University School of Medicine: Study shows way to test health claims of probiotics