Something you ate?
Lactobacillus rhamnosus (*left*) and *L. paracasei* are two bacteria consumed in nutritional supplements and cultured dairy products.

Credit: Nestlé

Mmmm … Bacteria

By Elsa Youngsteadt
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When you eat a cup of yogurt, billions of bacteria make their way to your gut. Some researchers believe that these "probiotics" can be good for you, alleviating everything from bowel disease to allergies. Now, a team of researchers has shown that, at least in mice, supplementing food with a helping of "good" bacteria can cause profound metabolic changes, including some that may be linked to weight loss.

The human gut hosts 1000 species of microorganisms--more than a kilogram of cells in all. Recent studies indicate that this thriving ecosystem plays an important role in human health and may even contribute to obesity (*Science*NOW, 20 December 2006). Last year, Jeremy Nicholson, a biochemist at Imperial College London, and a team of researchers from Imperial College and the Nestlé Research Center in Lausanne, Switzerland, showed that replacing mouse gut microbes with human microbes caused widespread metabolic changes in the mice (*Science*NOW, 23 May 2007). Nevertheless, scientists remained skeptical that probiotics could have a similar effect, because probiotic foods add only a few billion foreign microbes to a native population of tens of trillions.

In the new study, Nicholson's group returned to the mice harboring human gut microbes. The researchers supplemented the animals' diets with a solution containing one of two species of *Lactobacillus* bacteria, which are present in yogurt and baby formula. Control mice were given saline solution as a supplement.

After 2 weeks, the team measured the metabolic profiles of the mice, analyzing feces, urine, plasma, intestinal contents, and liver tissue. The results, published in the 15 January issue of *Molecular Systems Biology*, show that although the composition of gut microbes changed only slightly in the three groups of mice, the animals' metabolic profiles--including various markers for blood cholesterol and amino acid levels in the liver--were profoundly different.

Of particular note, says Nicholson, was the effect of probiotics on bile acids, which help the small intestine absorb fat. Probiotics diminished the function of the acids, Nicholson notes, which may make it harder for the animals to absorb fat--and thus should keep them slim. As for how a relatively small number of foreign microbes could have such a dramatic effect, Nicholson believes it results from communication with the native bugs. "Gut bacteria talk to each other," he says, so despite their relatively modest numbers, "probiotics have a huge effect on what those other bugs do."

Although he cautions that the gut is simpler in the experimental mice than in humans, Glenn Gibson, a microbiologist at Reading University in the U.K., calls the work "very thorough" and says that it foretells an exciting and potentially revolutionary future in which microbial interventions can correct metabolic abnormalities. "We can't change human genetics," he notes, "but if we can alter metabolism with minor changes in gut bacteria, that's very exciting."