

# Gut ecology in transplant patients

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Small-bowel transplant patients with an ileostomy -- an opening into their small bowel -- have a very different population of bacteria living in their gut than patients whose ileostomy has been closed, researchers from UC Davis and Georgetown University Medical Center have found. The results are published online Sept. 14 in the *Proceedings of the National Academy of Sciences*.

By studying bacterial DNA, the research team found that in ileostomy patients, the [gut bacteria](#) were mostly Lactobaccilli and Enterobacteria, groups that can use oxygen in their metabolism. In patients whose ileostomies had been closed, the population was made up mostly of [Bacteroides](#) and Clostridia, bacteria to which oxygen is toxic.

The team included Amber Hartman, a graduate student from Johns Hopkins University working at the UC Davis Genome Center; UC Davis Professor Jonathan Eisen; and Michael Zasloff, professor of surgery and pediatrics at Georgetown University.

Patients who receive a [small-bowel](#) transplant usually have a small opening, or ileostomy, left to the outside so that doctors can monitor the transplant for signs of rejection. In their study, the researchers were able to follow changes in the gut bacteria of 17 transplant patients for up to two years by taking periodic samples from the small bowel through the ileostomy opening.

The study grew out of a chance meeting between Eisen and Zasloff, an old family friend, at a scientific meeting in Georgetown. Zasloff

explained his transplantation work and asked if Eisen would be interested in looking at microbial diversity in the gastrointestinal system.

"This project represented a very unique opportunity to study the recolonization of the ileum, or small bowel, after a disturbance -- transplantation -- much like studying regrowth of a forest after clearcutting," Eisen said.

The researchers conducted [DNA analysis](#) that focused on a particular gene, for ribosomal DNA, that is present in all species of bacteria but varies in small ways among species. Using both DNA sequencing and quantitative polymerase chain reaction analysis of this gene, the researchers were able to measure the relative proportions of different types of bacteria.

Among ileostomy patients, the populations seemed to be fairly stable over time and dominated by bacteria that are "facultative anaerobes" -- they can use oxygen, but don't need it.

In 10 patients, the ileostomy was eventually closed. Samples taken from some of these patients by colonoscopy showed strictly anaerobic bacterial populations -- oxygen is toxic to them. This anaerobic mix of [bacteria](#) is thought to be similar to that of a normal human bowel.

The results show that the gut can have two different, stable bacterial ecosystems, the researchers wrote. Normally, the gut is low in oxygen. When [oxygen](#) can get in through an ileostomy, the population shifts to a different, but also stable ecosystem.

Neither type of bacterial population seemed to be associated with any particular harm to the patient. However, an abrupt change in population may be linked to severe illness, the researchers note.

Source: University of California - Davis

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