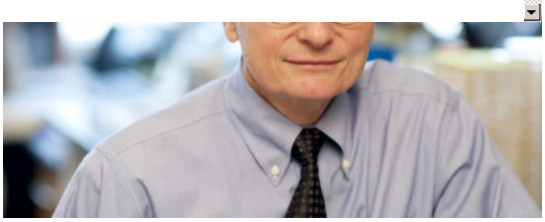
Infections are a common cause of complications in cancer patients. Now a laboratory study reveals that even a single dose of a commonly prescribed antibiotic could increase susceptibility to infection with a certain bacterium in the intestine. The Memorial Sloan Kettering research team also demonstrated why the antibiotic has this harmful effect.



Eric G. Pamer, Head of the Division of General Medicine

"We knew that this bacterium, *Clostridium difficile*, is a major cause of complications in hospitalized patients, particularly those who have received antibiotics. However, it was unclear how antibiotic-induced changes in naturally occurring bacterial populations in the intestine make people more susceptible to infection with this particular bacterium," explains Eric G. Pamer, Head of the Division of General Medicine and senior author of the study, which was published in the January issue of *Infection and Immunity*.

Upsetting the Balance of Bacteria

Building on earlier work, the team — which included MD/PhD student Charlie G. Buffie and Joao Xavier of the Computational Biology Program — hypothesized that treatment with the antibiotic clindamycin was eliminating many types of nonharmful bacteria in the intestine, making it easier for harmful bacteria such as *Clostridium difficile* to take over.

In this study, mice that had been given the antibiotic clindamycin and were exposed to *Clostridium difficile* were highly susceptible to infection: About 40 percent of them died from severe weight loss, and those that survived had bowel inflammation that remained for up to a month. Just one dose of the antibiotic made the mice susceptible to infection for up to ten days after treatment.

Using a DNA sequencing platform for bacteria, the researchers determined that 87 percent of bacterial species that were present before treatment with the antibiotic had been destroyed.

"Loss of bacterial diversity can allow *Clostridium difficile,* normally a small part of the microbial makeup in the intestines, to take over," Dr. Pamer explains. "Understanding the mechanisms by which nonharmful bacteria protect against infection with more harmful pathogens is an important and exciting frontier in research. Our ultimate goal is to identify bacterial species that prevent *Clostridium difficile*-caused colitis and to find ways to replenish them in vulnerable patients."

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