

Synthetic 'Poop' Can Cure C. difficile Infection, Study Finds

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A synthetic “poop” developed at the University of Guelph can cure nasty gastrointestinal infections caused by *Clostridium difficile*, a toxin-producing bacterium.

A study on the artificial stool was published today in the inaugural issue of Microbiome, a new peer-reviewed science journal.

The stool – a “super-probiotic” called RePOOPulate – was created by Guelph microbiologist Emma Allen-Vercoe to replace human fecal matter used in stool transplants, a known treatment for *C. difficile*.

She made the super-probiotic from purified intestinal bacterial cultures grown in “Robo-gut” equipment in a Guelph laboratory that mimics the environment of the large intestine.

Besides offering an effective therapy against the deadly superbug, the artificial poop is safer, more stable and adaptable, and less “icky” than treatments for *C. difficile* infection such as fecal bacteriotherapy, the study said.

“It’s an exciting finding,” said Allen-Vercoe, a professor in Guelph’s Department of Molecular and Cellular Biology.

She worked on the project with lead researchers Dr. Elaine Petrof, an infectious disease specialist at Kingston General Hospital and a professor at Queen’s University, and Gregory Gloor, a biochemistry professor at the University of Western Ontario. Guelph pathobiology professor Scott Weese and researcher Michelle Daigneault were also involved.

C. difficile can overpopulate the colon when antibiotics kill healthy gut bacteria. *C. difficile* infection causes many gastrointestinal problems, including severe diarrhea, and often leads to outbreaks in hospitals and long-term care facilities.

Few treatments exist for people with recurring *C. difficile* infections.

Stool transplants are among the more effective therapies, but human fecal matter may contain unknown pathogens, Allen-Vercoe said. “That puts people at risk for future disease.”

Stool transplants are also limited by lack of acceptance among patients and health-care facilities and lack of standardized treatment regimens.

Using synthetic poop for transplants eliminates the risk of transmitting an infectious disease through fecal bacteria because “the exact composition of the bacteria administered is known and can be controlled,” Allen-Vercoe said.

The method may be modified to suit individual patient needs, is easily reproduced, and is more appealing to many patients and physicians, she said.

The researchers tested RePOOPulate on two patients with chronic *C. difficile* infections who had previously failed to respond to several rounds of antibiotics. After treatment with the synthetic poop, both were symptom-free within three days and tested negative for *C. difficile* six months later.

As well, later microbial profiles of both patients showed that some features of the synthetic stool stabilized in their colons. “In other words, the introduced microbes were able to persist,” Allen-Vercoe said. “This is important because most commercially available probiotics only colonize transiently.”

Allen-Vercoe hopes doctors will one day use the RePOOPulate concept to treat other GI conditions, such as inflammatory bowel disease, obesity and even autism by replacing abnormal gut microbial ecosystems.

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