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Poo transplants to treat range of diseases

7-9 minutes

We face some pretty grim treatment options for the sake of our health. We swallow foul-tasting pills, vaccinate ourselves with live microorganisms, rub smelly tinctures into our wounds, and ask surgeons to cut us open. But few treatments are as grotesque as the poo transplant.

A model of a human colon, showing appendicitis, cancer, Crohn's disease, spastic colon, ulcerative colitis, polyps, diverticulosis, diverticulitis, bacterial infection and adhesions.

Getty Images

Thomas Borody is a veteran of faecal microbiota transplantation - or trans-poo-sions, as he calls them. From his Sydney practice at the Centre for Digestive Diseases, Borody treats up to 10 patients per week with faecal transplants, and has performed close to 2000 since his first in 1988.

"I had a very sick patient and I didn't know what to do with her," recalls Borody. "She went to Fiji, came back and had terrible diarrhoea."

The diarrhoea was so severe that the patient's bowel had developed angry patches of inf lammation, or colitis, and visits to several doctors and specialists had left her without answers or relief. Borody was also at a loss until he found a landmark paper from 1958 describing the treatment of four patients with colitis using faecal enemas.

Borody's response was immediate. "I said, 'Why don't we try this?'"

For a technique that seems to go against every human instinct that has evolved to keep us healthy, you would certainly hope that it works. For Borody's patient, as for the four patients described over half a century ago, the results were dramatic - the diarrhoea and colitis cleared completely.

In North America, faecal transplants have gained popularity recently, as doctors grapple with an epidemic of lethal Clostridium difficile infection, or CDI. CDI is usually picked up in hospitals, where it infects patients whose gut microflora have been wiped out by antibiotics. Unchallenged by the natural ecosystem, CDI flourishes, spewing out toxins that inflame and damage the gut lining. In the United States alone, there are some half million cases of CDI each year, with 15,000-20,000 patients dying. Faecal transplantation can be the difference between life and death, and estimates put its success rate at 90%.

Unlike blood infusions and tissue transplants, faecal transplants require no immunological typing to prevent rejection. And while this means that the donor pool is essentially limitless, Borody and other practitioners try to ensure that the faecal samples they get are as healthy as possible. This means excluding people with known infections, such as HIV or hepatitis, as well as those with any number of a cadre of maladies that have been linked with an unhealthy bowel, including irritable bowel syndrome, colon polyps, gastrointestinal cancer, or metabolic syndrome. People with autoimmune conditions and those who have travelled extensively are also put in the exclusion category, as they may be unwittingly harbouring unidentified pathogens. Borody currently has four regular donors that provide him with all of the high quality poo that he needs.

Although the procedure is still raising a few eyebrows due to the 'yuck' factor, there have been no reports of adverse side-effects. "Poo, as awful as it may sound," says Borody, "just doesn't seem to be associated with any complications."

Not only does faecal transplantation save lives, but it also highlights the incredible complexity and occasional fragility of the communities that inhabit our innards. Far from being freeloading stowaways, the trillions of microbes that call our gut home effectively function as an organ that has evolved alongside us to perform specialised functions in digestions and immunity.

"It's been very short-sighted to ignore the contribution of the microbiome in health and disease," says Clare Fraser, head of the Institute for Genome Sciences at the University of Maryland's School of Medicine.

In 1995 Fraser was part of the team to complete the first ever sequence of a bacterial genome- the pathogen Haemophilus influenzae - and has been at the vanguard of genome sequencing ever since. Her current research is part of a global effort to understand our nearest neighbours - the bacteria that live and thrive on and in us. Major initiatives, such as the Human Microbiome Project in the United States, and the Metagenomics of the Human Intestinal Tract project funded by the European Commission, are beginning to define the species that reside in these microbial communities, in sequencing efforts akin to conducting 10 human genome projects.

Like others in the field, Fraser's attentions have been drawn to the expanding obesity epidemic. Fraser and her colleagues are trying to understand the differences in gut microbiota between lean and obese people, as well as between people with and without metabolic syndrome, a frequent precursor to the onset of obesity-related Type 2 diabetes.

To do this, Fraser has looked at the gut microbes of the Amish. Genetically homogenous and eschewing prescription medications, the Amish are an ideal population for such a study.

What Fraser found was a striking difference in gut communities between people. The line of difference was not drawn between the skinny and obese, however, but between those with and without metabolic syndrome, regardless of their weight. Importantly for Fraser, the differences fit well with what was already known about certain gut species. For people with metabolic syndrome, organisms known to inhibit inflammation in the bowel were less abundant.

"This was very exciting," says Fraser, "because we were starting to see an association between metabolic syndrome, which is known to be associated with increased inflammation, and a corresponding decrease in microbes that are thought to mediate an anti-inflammatory response in the gut."

How these different communities are established in each individual, and exactly how they influence our health are questions that are yet to be fully answered. While ecosystem composition is important, the ultimate goal, according to Fraser, will be in understanding how different communities function, "or whether some of these communities are more resilient to change under various stresses."

According to Martin Blaser, an infectious diseases researcher at New York University, one of our greatest lifestyle problems could be antibiotics. By messing with our body's natural gut flora, antibiotics may even be making us fat, just as farmyard animals fed antibiotics gain more weight.

Borody agrees. "We've spent the last 60 years damaging our largest organ with antibiotics," he says.

As sequencing of the gut microbiome continues, and an understanding of what factors damage and protect our microbial residents emerges, an appreciation of the simple yet unsavoury practice of faecal transplantation could develop. The range of diseases that it might treat could also be considerably expanded as we begin to pick apart the array of diseases - from asthma to multiple sclerosis and Parkinson's disease - that the gut microbiome is implicated in.

"Hopefully," says Borody, "this will become one potential restoration."