

Fecal Microbiota Transplantation Remedies *C. diff* Infection

Research May Reveal Other Roles

Neilanjan Nandi, MD, an assistant professor of medicine in the Division of Gastroenterology & Hepatology, arrived at the College of Medicine eager to bring fecal microbiota transplantation (FMT) to Drexel. The procedure has generally been considered a last resort for patients with recurrent *Clostridium difficile* infection (RCDI), characterized by diarrhea, fever, bloating and abdominal pain. The treatment involves taking fecal matter from a healthy donor and delivering it to the large intestine of an infected patient. By re-colonizing the gut with a healthy donor's stool, the microbiota equilibrium may be restored. This is often enough to maintain remission after just one (and rarely two) transplanta-

tions. FMT has been particularly beneficial in patients experiencing relapse despite expensive and prolonged use of antibiotics (such as vancomycin and fidaxomicin) and multiple hospitalizations.

A 1,700-year-old emergency medicine text contains one of the first recorded recommendations for FMT, but the first recorded case in the United States wasn't performed until 1958. The procedure has remained relatively obscure until the past few years, due in part to the "ick" factor, but also perhaps because of lack of awareness. Though many practitioners do not offer the service, FMT is gaining more acceptance.

It's a simple process: First, a donor is identified and screened for diseases such as HIV,

hepatitis, syphilis and parasites, as well as general overall health. The donor's fecal matter is blended in saline and transferred to the patient via colonoscopy, enema or nasoduodenal tube. Nandi performs all modalities, but prefers colonoscopy in most cases. ND tube transfer comes with a rare but serious risk of aspiration of fecal matter into the lungs. Enemas do not reach the proximal part of the large intestine, and some patients have difficulty retaining the mixture. Neither of these is a significant concern with colonoscopic delivery.

Nandi trained at the University of Miami, where he began performing FMT. He was overwhelmed at the patient response. He recalls, "I would have people call me, sometimes within hours of the procedure,

saying, 'Doc, I don't how this is happening, but I am starting to feel better!' It was incredibly rewarding to be able to help these patients, many of whom had been terribly sick for months." At that time, the FDA regulated all uses of FMT. In June 2013, the FDA lifted sanctions specifically for the use of the procedure on patients who have had at least three recurrences of mild to moderate *C. diff*. Despite this, several Hahnemann University Hospital patient safety and review committees were convened before Nandi could proceed with FMT at the hospital.

Because it is still a relatively new procedure, patient access remains an issue. Many insurance companies are beginning to cover the cost of colonoscopic delivery of donor stool, but even if the procedure itself is covered, the out-of-pocket costs of donor screening range from \$500 to \$1,500, which can pose a significant financial burden for the patient. Hence, Nandi is in the process of establishing a donor bank of frozen stool to cut costs and provide stool on demand, particularly for use in urgent situations.

Presently, Nandi can perform FMT for recurrent *C. difficile* infection, but his aspirations go well beyond this initial frontier. He is excited about the opportunity to engage in collaborative translational and clinical research regarding other potential applications of FMT, as well as the role of the gastrointestinal microbiome in other illnesses. In case report studies, FMT has been implicated in remedying disease states ranging from multiple sclerosis and Parkinson's disease to obesity and cardiovascular disease. Nandi warns, however, that FMT should not be hailed as a panacea: "The therapeutic efficacy of FMT in RCDI is proven, but we have yet to establish its efficacy in other disease states. Therefore, we should not be overzealous in performing FMT for other diseases without careful scientific scrutiny." Nandi hopes to gain approval to study the efficacy of FMT in the treatment of chronic pain and obesity.

Kenny Simansky, PhD, vice dean for research at the College of Medicine, is enthusiastic about the proposed work: "Dr. Nandi's aspirations to conduct research on broader applications of FMT fit well with Drexel's expertise in areas such as the mechanisms and treatment of infectious disease and the role of the microbiome in human health. The effectiveness of FMT in RCDI underscores that we must be receptive to nontraditional strategies for therapeutics and maintaining wellness. It is critical, however, that we apply our usual rigorous standards for scientific evaluation of such strategies before we propose them as standard care."



Gastroenterologist Neil Nandi has high hopes for FMT.