Scientists study the benefits of worms

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Of all the things young children put in their mouths, dirt may provoke the most concern among parents fearful that eating it will give kids worms.

Although there are reasons not to eat soil, worms may not be one of them.

Researchers have long been investigating the link between being too clean and failing immunity. Fecal material from healthy people has been shown to help fight antibiotic-resistant infections in patients for whom nothing else worked.

Now, some scientists, private companies - and even Web-surfing patients - are looking into the potential health benefits of ingesting worms.

In the developed world, it's been decades since intestinal worms were a familiar part of the human biome, the general term for all the organisms that thrive in people.

But as worms have disappeared, rates of autoimmune and allergic diseases have skyrocketed. The correlation doesn't necessarily mean causation, but it is getting more attention.

William Parker, associate professor of surgery at the Duke University Medical Center, said the worm-allergy connection "was published about 40 years ago. It was written by a guy who colonized himself with some intestinal worms and said, 'Oh! My hay fever went away.'"

The pioneering worm advocate, British scientist John Turton, had a hunch that intentionally inducing an immune response with human hookworm might quell his body's internal war on pollen.

The human immune system evolved in the presence of these intestinal worms, known as helminths. Decades ago, human antibodies attacked the worms, keeping them at bay. But since the 1960s, when the Western world orchestrated a mass extinction of this worm population, those antibodies have sought a new target. For many, that's meant an overreaction to pollen and even their own bodies, Parker said.

"As far as the big picture of human health goes, it's pretty much already accepted that when you put helminths back into the ecosystem of the human body, you can resolve allergic and autoimmune diseases," he said.

Helminthic therapy is done with worms at the tiny, larval stage, not the kind of long worms that populate parental nightmares. As human antibodies do their work, depending on the species, the worms die off before they can grow, or before they can proliferate.

Neilanjan Nandi, assistant professor of gastroenterology at the Drexel University College of Medicine, said it's a routine question he hears in the clinic: Can helminths work for me?

Although the use of helminths in humans is not approved by the U.S. Food and Drug Administration (clinical trials are continuing), there are about 7,000 people in the world using helminths for a variety of diseases. Treating diseases that stem from chronic inflammation appears to hold the greatest promise.

Published clinical trials out of Joel Weinstock's lab in 2005, formerly at the University of Iowa and now at Tufts Medical Center, suggested that pig whipworm provides relief for people with ulcerative colitis and

Crohn's disease. And a 2008 study from the Raul Carrea Institute for Neurological Research in Argentina showed that helminthic therapy has potential for treating patients with multiple sclerosis.

Parker, who recently published a study on self-treatment with helminths, said those using worms as a curative agent fall into two groups.

"About half are very well educated. A lot of them are scientists, or are in the medical field; and the other half either knows one of those people or weren't that educated but got very, very sick" and educated themselves.

Parker said a helminth supplier told him about 25 percent of its clients were medical professionals who used the worms themselves, but many won't recommend helminths to their patients because they do not have FDA approval.

But some doctors already are suggesting helminths for their patients.

"Most antibiotics are not FDA approved for children, either," said Nancy O'Hara, a pediatrician with a private practice in Connecticut. "They have not been tested on children. They have been tested on people who are older than 12, but because they're thought to be safe, we give them to children."

O'Hara has been treating her patients with Hymenolepis diminuta cysticercoids (HDCs), the larval stage of the microscopic rat tapeworm, for the past six years.

Although Nandi at Drexel said he does not recommend helminths for his patients with inflammatory bowel disease, he thinks the therapy is promising, and more research is warranted.

He is not surprised that some people are treating themselves.

"As patients get sicker, they'll do almost anything to feel better. When patients are seeking alternative therapies, it speaks to the suffering that they're going through."

Depending on the species, helminths are administered through a liquid patients drink or are placed on a bandage applied to the skin, which absorbs them.

For Rosemary Kind, a writer from North Yorkshire, England, helminths were a last resort for severe food allergies.

"My diet went from being completely normal to one thing after another I couldn't tolerate," she said. "It had reached the point where all I had left to eat were 26 foodstuffs. I was getting really worried. I didn't know where it was going to end."

After conventional treatments failed, she read an article on helminthic therapy.

"That's gross. I really don't want to do that," was her first reaction. Still, she tried it. There are now only six food items she can't eat, and she continues to use helminthic therapy.

"People are absolutely grossed out by the idea of worms. I think it's the wrong word to use," said Donna Beales, a medical librarian in Boston who used helminths to treat angioedema, a rapid swelling of the throat tissue that left her feeling like she was suffocating.

"We use the word worms and we use the word parasite. I think this just calls up a lifetime of negative thought process," said Beales, who said the worms "worked beautifully" for her condition. She stopped using them, however, because of side effects such as stomach pain.

Whether helminths are parasites is controversial.

Parker says they are not. Nandi says they are, but "not all parasites are created equal."

Some parasites can be harmful, he said, but others, like certain helminth species, "don't have any deleterious effect on the host. They may have benefit, but they don't have harm."

It will be some time before anecdotal reports of helminthic success are backed by enough clinical data to win FDA approval. The clinical trials are complicated by issues of supply, the unknown of how many doses are needed, and how long treatment can take before showing results, Parker and Nandi said.

Advocates of self-treatment stress that helminths must be carefully selected. Four worm species are sold by commercial suppliers for use in helminthic therapy.

Not just any worm will do.

"The porcine tapeworm, which is really bad, can form cysts in the brain," Parker said. This worm is acquired from eating raw pork and is not used for helminthic therapy.

People considering self-treatment with helminths are advised to speak with their physicians. Some will counsel caution, but others may think it's worth a try.

"The risk-benefit ratio is so skewed to the benefit side," O'Hara said. "Helminths are much safer than any medication I've ever put any child on, or any adult. I really do think that this is something more and more physicians need to consider."