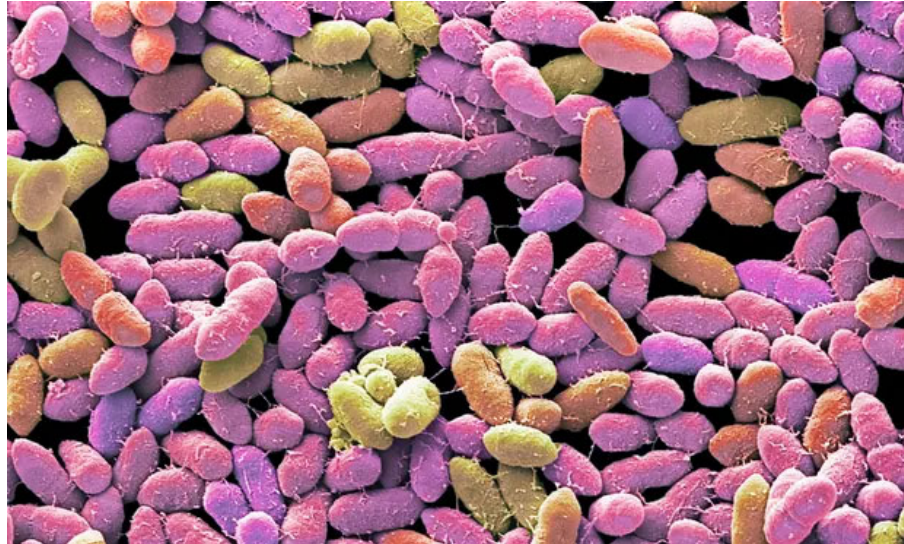


daily news podcast



📷 A faecal microbiota transplant helps an unhealthy gut to 'repopulate the bacterial microenvironment'. Photograph: Steve Gschmeissner/Getty Images/Science Photo Library RF

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Inside your gut is a thriving community of trillions of microbes. Thousands of species of bacteria, viruses, fungi and other microorganisms make up this diverse microbiome, which weighs about 2kg. Its health is affected by your environment and what you eat, and in turn it affects your metabolism, immunity and even your mood.

To be healthy and to keep humans healthy, the microbiome needs to be diverse. That has become an increasing problem in the modern world, where diets are less diverse and get battered by medical treatments such as antibiotics.

In some people, the microbiome has been so badly damaged it needs new microbes to be introduced - for them, a poo transplant can be life altering, even life saving.

[The first poo transplant has been officially approved in Australia](#) - in fact, it's the first time a faecal microbiota transplant (FMT) has been given regulatory approval anywhere in the world.

FMT is the process of taking the poo of someone with a healthy gut and inserting it in someone with an unhealthy gut to "repopulate the bacterial microenvironment in a recipient's bowel with healthy microorganisms", [according to the Therapeutic Goods Administration](#).

What can FMT treat?

For now, the only approved FMT therapy is for infection by the *Clostridioides difficile* bacterium, which used to be called *Clostridium difficile* and is commonly called *C diff*. It is an infection of the gut that can be very serious, even deadly.

Dr Sam Forster, an FMT and microbiota expert from the Hudson Institute of Medical Research in Melbourne, says for some people whose gut has been disrupted by antibiotics or other medical treatments, it's as though their internal rainforest (the microbiome) has been razed to the ground. Then the *C diff* bacterium pops up like a weed and starts producing toxins.

An FMT, then, is revegetating the landscape.

"You need to put something in there to occupy the space ... to block out the weaker competitor," he says.

"That results in the cure for the patient because there's no *C diff* producing toxins anymore. They now have the rainforest so they don't get the reinfection."

There are hundreds of research projects looking at what else FMT might be able to help with.

There is evidence that it can work to treat ulcerative colitis and other types of inflammatory bowel disease.

There is also promising research into how it might work in combination with cancer immunotherapy, where it could help prime the immune system to make the therapy more effective.

Obesity and autism are often touted as conditions that can potentially be treated with FMT - in fact, there are all sorts of claims for what FMT can treat, ranging from the promising to the ludicrous, but at this point the evidence is not in.

“The problem is we’re very much at an early stage with a lot of the conditions,” Forster says. “If there’s inflammation involved, it’s possible FMT might work, but more likely you’ll need a defined mixture.”

That means, instead of transplanting stool directly, some conditions might benefit from a more bespoke mixture with particular combinations of microbes.

How do you find a suitable poo donor?

Because so few people are eligible to become donors, they are sometimes referred to as “unicorns”. The unicorn donor must not have any chronic gastrointestinal disorders and infectious diseases or be immunocompromised. They also cannot have had any recent courses of antibiotics. They’ll be screened for a range of diseases.

At BiomeBank, the biotech firm in Adelaide whose FMT has just been approved by the TGA, there is [a special loo for poo donors](#) to make a deposit.

Not only do these unicorns have to come up with the right goods, they have to do so on demand.

(BiomeBank is working with the Hudson Institute to develop new therapies.)

What’s stage two for the poo?

That deposit is whisked away and gets tested again to make sure there are no pathogens that might not mean anything to a healthy person but could be devastating for someone who is immunocompromised.

“The sample then, for want of a better description, goes into the blender,” Forster says. “You obviously make sure the lid is on firmly.

“Equally, you have to make sure you’re storing it at appropriate temperatures and preventing oxygen exposure.

“There are very stringent protocols at that stage to make sure the sample doesn’t carry any of these other [harmful] species, including antibiotic resistant ones.”

How does it get put in the patient?

Under the TGA-approved method, the faecal sample then gets loaded into a syringe that goes on the end of a colonoscope. It’s frozen at -80C (so it can’t start multiplying) and thawed just before a physician inserts it in the patient’s anus on the end of a long, flexible tube. It’s deposited in the colon.

There are other options. The FMT can be delivered by an enema or down the nasal passage. BiomeBank is working on a capsule that could eventually be taken orally. But for now, it’s up the other end.

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“The advantage of delivering during a scope is that you can get a large amount there very quickly,” Forster says. “If you took it as a pill or a capsule, it would have to pass through the upper gastrointestinal tract to get to where it wants to live. You definitely don’t want a chewable tablet.

“Your problem is the volume - if you’re trying to put a few hundred millilitres of faecal material ... that’s probably a normal glass size. You wouldn’t want to deliver it that way.”

If and when it’s approved for other conditions, people might need more than one or two transplants, at which point there might be a combination of capsules or enemas along with the scope.

So once you have someone else’s poo in you, what happens?

“Effectively you’ve populated [their colon] with some bacteria,” Forster says.

“The diversity of the ecosystem starts to come back. The trees are growing, the birds come back ... Once you plant the trees, it takes time for different species to come back in.”

Once a fledgling rainforest is reestablished, the recipient will be getting exposed to more bacteria through their environment, which will all start to build a more optimal microbiome.

“If you’ve come and planted some trees, other trees will grow. In five years’ time it will look very different to the day you planted it,” Forster says.

Food provides the right nutrients, while the bacteria come from just being out in the non-sterile world, he adds.

What’s next for FMT?

At BiomeBank, they’re working on a second-generation treatment - the “super poo” - that will mean designer, synthetic transplants. Specific strains can be isolated and replicated without the need for a donor.

And meanwhile, research into what FMT can do for other diseases is continuing - but it’s complicated.

While treating *C diff* is about replanting trees to supplant the bacteria, other diseases might need more specific tree species, planted in a different way.

The microbiome is marvellously complicated and the way it interacts with the human body even more so - which is why [DIY FMTs](#) won't work and can be dangerous.

And there are warnings that some scientific studies might be producing "misleading and false results".

[A study](#) from the University of Adelaide and the South Australian Health and Medical Research Institute warned that a majority of trials reporting positive results did not have enough detail to be reproduced.

Researchers found in many cases there was no quality control and that an absence of regulation and a lack of transparency could be undermining the credibility of microbiome science.

While wild claims should always be treated with a healthy dose of scepticism, Forster says that, on the bright side, Australia is leading the way in microbiome and FMT research.

Australians punch above their weight in microbiology, immunology, and infomatics and computational analysis, which links in genomics.

And now, thanks to the TGA, it has a world-first regulatory precedent on FMT, he says.

In short, there are plenty of smart Australians doing some really good shit.

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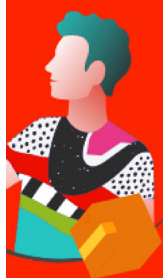
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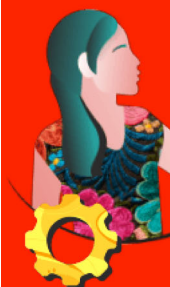
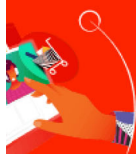
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