

The microbes are coming

So, your three months of dieting have gone really well, but it still feels like the weight wants to come back on. Maybe your gut feeling is spot on. What if you're harbouring trillions of little microbes that simply won't accept this dieting stuff and are "telling" your brain to get back to your plump old self?

Sound like science fiction? Well, science, yes. But fiction? No. Sequencing studies based upon the 16S rRNA genes have shown that we all share core organisms in the gut at least and deviations can be associated with various adversities, including obesity.¹ Blaming the organisms we inherited for our inability to touch our toes sounds like a good excuse. But it also opens up a novel weight-loss solution: What if we could take the bacteria from our lean cousin and use it to replace our own?

Bacteria therapy has been used successfully in other applications. For example, the infusion of someone else's bacteria-laden feces dissolved in saline and delivered via nasogastric tube, has been shown to cure *Clostridium difficile*.²

However, curing a bacterial infection is one thing, curing a predisposition is another, especially if recalcitrant microbes out-compete the new arrivals and continue to signal the brain to increase food intake.

There is encouraging news however. Mouse studies performed by Ruth Ley at Cornell University indicate that the microbiota have more control over what we eat than we might think.³ The mechanisms appear to involve signaling molecules produced by the microbiota that reach the brain through sensory pathways and influence satiety control in the hypothalamus. Exquisitely depicted in a recent review,⁴ the gut microbiota are linked with afferent and efferent vagus nerves, blood glucose and insulin, and they influence glucose homeostasis in the pancreas, muscle, liver, adipose tissue and brain. Having evolved a homeostatic existence, the microbes are reluctant to be displaced either by the arrival



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of another microbiome, or by major changes in food intake. Implantation of anti-obesity organisms immediately after birth might one day reduce the risk of obesity and metabolic syndrome, or other conditions that could otherwise adversely affect quality of life and longevity. But that step will require more microbiome disclosures and mechanistic studies, as well as heated ethical debate.

For most people, thinking about fecal transplants or swallowing bacteria might seem like a stress inducer. But the positive results in other areas show it can actually reduce stress. Two months' daily intake of powdered *Lactobacillus casei* Shirota, better known as the organism in Japanese sweet milk drink Yakult, was found to significantly lower anxiety symptoms in chronic fatigue syndrome patients' possibly via increasing plasma tryptophan levels, decreasing serotonin metabolite concentrations in the frontal cortex and dopamine metabolite concentrations in the amygdaloid cortex. Meanwhile, studies by John Bienenstock at McMaster University have shown that *Lactobacillus reuteri* and *Bifidobacterium animalis* strains can reduce stress in mice in open field tests, further indicating a link between the gut and behavioural areas located in the brain [unpublished data].

If you're now convinced that you should indeed reach out for those beneficial bugs, you'll now have to figure out which ones to buy, and where to get them. Sadly, relying on dietary supplement or food labels to give you the

answer, or most pharmacists, physicians or health food store assistants, is usually a lost cause. And among products claiming to be probiotic that have flooded the marketplace worldwide, only a few have proven efficacy and/or mechanisms of action, and none are able to make disease prevention or treatment claims because that's how governments have set up the regulatory systems. In truth, the right mixture of anti-obesity probiotics are not yet available and more research will be required, but the answer may not be as far off as you might think. Some reliable, strains clinically documented for various benefits such as *L. reuteri* (DSM 17938 and RC-14), *B. animalis* (DN-173 010 and Bb12), *L. casei* (Shirota and DN-114 001) and *Lactobacillus rhamnosus* (GR-1 and GG) are available in dried and food formulations, but you need to do some digging to make sure you are not buying untested copycat strains.

In the end, like it or not, for many ailments including those we thought we controlled, the microbes are coming and we'd better keep the car running. Or else, we'll miss the boat to a new land of diagnostic, disease treatment and prevention opportunities. Stayed tuned for ferry crossing times.

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