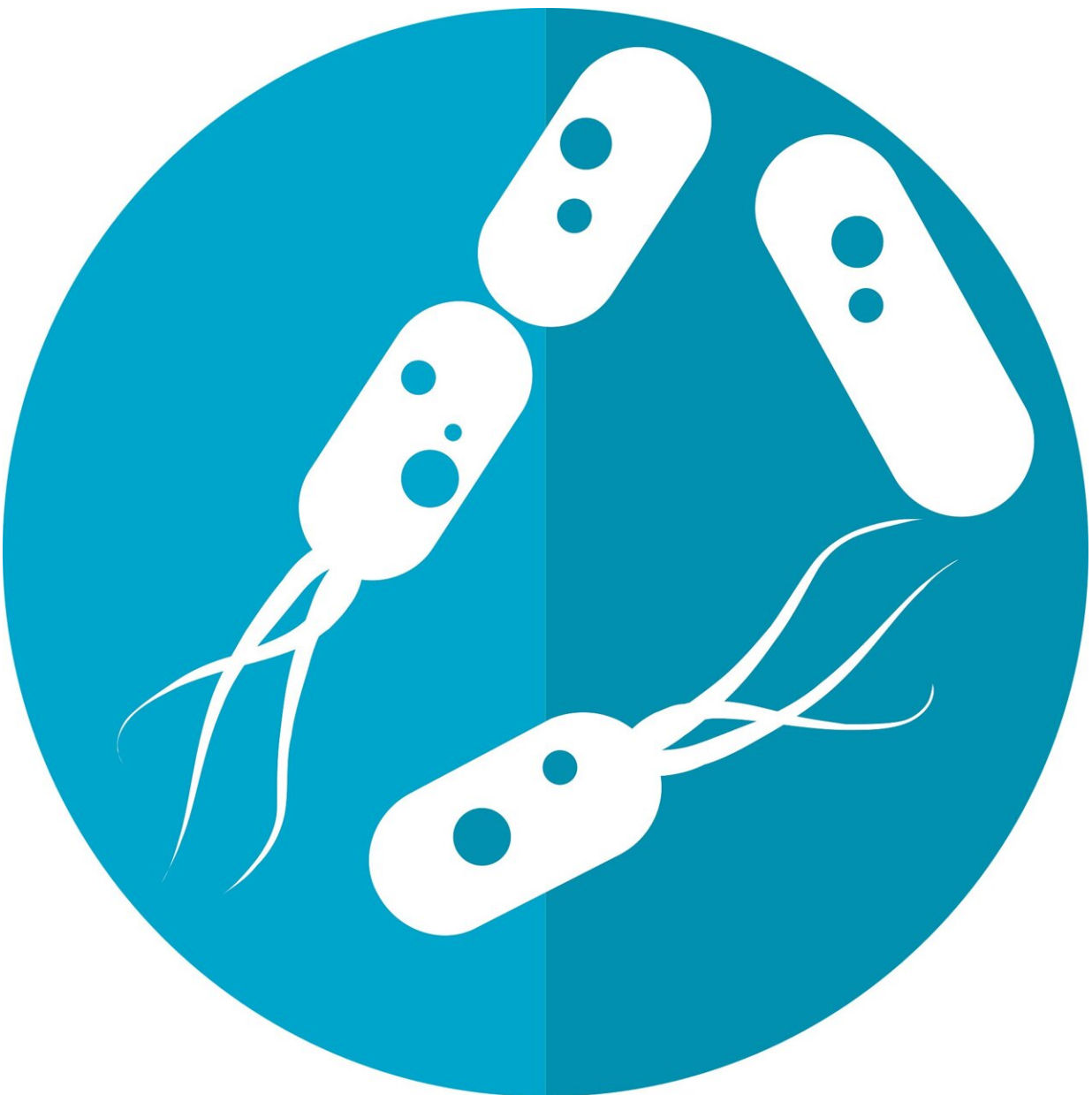


Which microbes live in your gut? A microbiologist tries at-home test kits to see what they reveal about the microbiome

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When you hear about the gut microbiome, does it ever make you wonder what tiny creatures are teeming inside your own body? As a [microbiologist](#) who studies the microbiomes of plants, animals and people, I've watched public interest in gut microbes grow alongside research on their possible [dramatic influence](#) on human health. In the past several years, microbiome testing techniques used by researchers like me are [now available to consumers at home](#). These personal gut microbiome testing kits claim to tell you what organisms live in your gut and how to improve your gut microbiome using that data.

I became very interested in how these home test kits work, what kind of information they provide and whether they can really help you change your gut [microbiome](#). So I ordered a few kits from Viome, Biohm and Floré, tried them out and sifted through my own microbiome data. Here is what I learned.

How do gut microbiome kits work?

All gut microbiome kits require you to carefully collect fresh fecal material. You put it in the various tubes provided in the kit and mail the samples back to the company. Several weeks later, you'll receive a report describing the types of microbes living in your gut and suggestions on how to change your diet or activities to potentially alter your gut microbiome.

What consumers don't exactly know is how companies generate the microbial profile data from your fecal sample. A typical approach I and

other microbiome researchers use is to extract and decode the microbial genetic material from a sample. We use that genetic material to identify what species of microbes are present. The challenge is that [this process can be done in many different ways](#), and there are no widely agreed-upon standards for what is the best method.

For example, microbiome analyses can be done on two types of genetic material, [RNA](#) or [DNA](#). If the profile is based on DNA, it can give you a snapshot only of what types of microbes are present, not what microbial genes are active or what activities they are doing in your body. On the other hand, if the profile is based on RNA, it can tell you not only what microbes are present, but also whether they're playing a role in your digestion or producing metabolites that can reduce gut inflammation, among other functions. Viome [generates its profiles](#) by looking at RNA, while the other companies use DNA.

Other data analysis choices, such as how different types of genetic sequences are sorted or which databases are used to identify the microbes, can also [affect the level of detail and utility](#) of the final data. Microbiome scientists are usually very careful to point out these nuances when interpreting their own data in scientific papers, but these details are not clearly presented in home microbiome kits.

What I learned about my gut microbiome

Though I used the same fecal sample for each kit, mixed well to ensure uniformity, I was surprised that each of the three products I tried gave me different impressions of my gut microbiome.

Each company gives an overall "score" on how your microbiome compares with what they consider to be "good" or "healthy." My scores ranged from 39% (not great) to 72% (good). Interestingly, Viome, which infers microbial activity by using RNA, gave the lowest score. It noted

that certain microbial activities happening in my gut, such as methane production and digestion efficiency, were not optimal.

I was also surprised by the variation in total microbial diversity each company reported. While there was general agreement in the overall groups of microbes present at the phylum level, a more general biological grouping, there was a huge range of variation at the species level, the most specific grouping. One company reported 527 species of microbes in my microbiome, while another reported 312. One reported only 27.

Perhaps the most surprising most surprising finding was that my gut may harbor a microbe that could (there are many caveats here!) pose a problem for me in the future if I experience certain medical situations. Even though all companies explicitly looked for this microbe in my gut microbiome sample, only two actually found it. While I won't name the exact microbe to protect my health privacy, I am not too worried about this result because more information, such as full genome sequencing of the microbe, is needed to better understand if this is actually a concerning strain of this microbe. But this finding does point to some surprising variation in results across different testing kits.

Can this data really improve your gut microbiome?

Many microbiome scientists like me would probably argue that the data these kits provide are limited in terms of giving you the power to alter your health. This is partly because gut microbiome science is still a new field with many unanswered questions.

One challenge is that different people can have [different proportions of microbes](#) present in their gut. This variation has made it difficult for scientists and health professionals to agree on what type of microbial community [makes a gut "healthy."](#) Some specific species, such as the

bacterium [C. diff](#), and some broad groups, like [Proteobacteria](#), are usually considered undesirable in high amounts. But there is no clear consensus on why one microbiome might be better than another.

Even if you did try to improve your gut microbiome based on what your gut test told you, the results might not turn out as you hoped. Probiotics or diet changes can alter the diversity of your gut microbiome and how it functions, but studies often find that each person can have different responses to these interventions, possibly because of their own [unique microbiome composition](#). The personalized ecology of gut microbial communities, combined with genetics, diet and other factors, makes it challenging to prescribe universal solutions.

So why bother getting a [gut microbiome](#) test? For me, it was illuminating to learn what microbes I carry around with me each day. When I eat my lunch, go for a run or get stressed out, the [microbes](#) in my gut respond to changes in my body. Researchers may not completely understand what those changes mean and how to manage our microbial partners, but getting to know who they are is a great first step.

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