

Gut: Probiotics and Prebiotics — Part 5

There are a lot of soil-based products out there: Primal Flora, Primal Defense, AOR 3, and so on. Some of you may know we used to use a product called Prescript-Assist, but there were changes in manufacturing and ownership, and I no longer recommend that. We use MegaSporeBiotic in our practice. That requires a physician's order, so it can be a little less convenient for patients if they want to be able to reorder. Enviromedica, who used to distribute Prescript-Assist in its previous form, has released a new product called Terra Flora, which is a synbiotic formulated with a combination of soil-based or spore-based probiotics and then food-based prebiotics. These are transient gut-commensal organisms that use an environmental vector soil to gain exposure to the host. They spend about 21 to 27 days in the gut, and they perform a variety of important functions. One of these is secretion of antimicrobial peptides. They have an antibiotic effect. This is a shelf-stable product. It is generally well tolerated. Note that soil-based organisms in general and Terra Flora in particular often are very well tolerated even by patients who do not do well with lactic acid-based probiotics. A good maintenance dose here would be one to two capsules a day.

You may have heard some concern expressed about spore-forming microorganisms, claims that they're dangerous and shouldn't be used. The term "spore-former" refers to microflora that can form spores that are biologically active. In other words, they can reproduce in the spore form and are highly resistant to the environment and cause disease. Endospore-formers, on the other hand, are biologically inactive and remain that way until environmental conditions allow them to resume their normal form. Terra Flora has endospore formers, but they simply pass out of the system if they ever form in the gut of any mammal.

The Relman-Stanford group studies have shown that soil-based organisms are more numerous in the gut than lactic acid microflora and that microflora resident in the healthy mucosa of the gut differ considerably from what is present in fecal material, which tends to have higher numbers of Lactobacilli and Bifidobacteria. The organisms in Terra Flora are recognized as class-one etiological agents, nontoxic and nonpathogenic, from independently maintained lines that have been used for decades in some of the most popular probiotics in other countries, with repeated consumption of doses amounting to 500 times the recommended daily use with no ill effects. I think it is a pretty safe product.

In cases where patients can't tolerate fermented foods, and for whatever reason Seed may not be an option, which is my favorite lactic acid-based probiotic, there are many other options out there. Ther-Biotic Complete from Klaire Labs can be a good choice. VSL #3, which I'm sure many of you have heard of, is a very high-potency lactic acid probiotic, and Elixia is another high-potency lactic acid probiotic. I will note, though, that these products do not have the more

sophisticated delivery system of Seed and some other newer-generation probiotics, and that is one of the reasons they have to use such a high potency. Many of the microorganisms that are contained in these products will not survive the stomach and small intestine, so their approach was just to address that with volume rather than a more sophisticated delivery mechanism.

Antibiotic recovery protocol

Intervention	Comments
Fermented foods	Dairy kefir particularly beneficial if tolerated
Fermentable fiber	Onions, garlic, jerusalem artichoke, chicory, etc.
Probiotics	SBOs + lactic acid bacteria, including <i>Saccharomyces boulardii</i>
Prebiotics	Soluble fiber, non-starch polysaccharides, and/or RS

Another use case I want to touch on is post-antibiotic treatment. There is a study done and published in Cell in 2018 that made a pretty big splash. You may have heard about it. They looked at how taking probiotics after antibiotics impacted the long-term trajectory of the gut ecosystem. They split the mice and humans into three groups. One group was just allowed to spontaneously recover over time after taking antibiotics. Group two was supplemented with an 11-strain probiotic for four weeks beginning right at the end of the antibiotic treatment. Then, group three underwent autologous FMT, fecal microbiota transplant. They had taken a stool, collected some stool sample from the patient before they took the antibiotics, and then they gave them a fecal microbiota transplant using their own stool from before the antibiotic intervention. The really surprising part of the paper was that probiotics were shown to slow the recovery of the normal microbiome after antibiotics. They found that treating the gut with probiotics delayed the return of the normal microbiota for as long as five months after stopping the probiotic treatment compared to a 21-day recovery period for the patients who did not take probiotics.

The take-home from this paper was that when all of the probiotic consumers were studied together, probiotic consumption led to transcriptional changes in the ileum with 19 downregulated and 194 upregulated genes. Much of it is related to the immune system,

including the B cells, and they also did a couple of other studies within this research that showed that there were significant differences in individual responses to probiotics.

This study definitely has raised some potential concern about taking probiotics after antibiotics, but there have been some critiques or questions raised about the study, and there is a lot of ongoing discussion happening around it. This study was done, I believe, with the antibiotic Cipro, so we do not know how this applies to other antibiotics. We have not seen this finding replicated yet by another lab. There are decades of research and thousands of studies showing the benefit of probiotics after antibiotic use in humans. I think we really need to learn more about this before we draw too many conclusions.

Putting this all together, it is also good to consider some studies that have shown a lower likelihood of *C. difficile* and adverse impacts of antibiotics when using probiotics, especially probiotics such as *Saccharomyces boulardii*, beneficial yeast. If a patient is in a hospital environment where they have a greater chance of acquiring *C. difficile*, that might require a different approach than someone taking antibiotics and probiotics in an outpatient setting. As an antibiotic recovery protocol, I recommend lots of fermented foods, lots of fermentable fibers. I still probably think that taking a probiotic after antibiotics might be a good choice, but we just don't know based on that recent study. The jury is still out. That could be something such as Seed or a soil-based organisms or *Saccharomyces boulardii*. I might also consider supplemental prebiotics in that situation to help the native microbiome reconstitute.

Okay. That's it for now. In the next section, we will discuss behavioral and lifestyle modification for treating the gut.