

## Fertilize the garden called “bowel flora”

By William Davis, M.D. | July 2, 2014

I like to think of bowel flora, the thousand or so species of microorganisms that inhabit the human gastrointestinal tract, as a garden. Probiotics, i.e., anything that provides microorganisms believed to be among the desired inhabitants such as the various Lactobacillus or Bifidobacteria species, are like planting seeds for peppers and zucchini in your garden in spring time.

But what if you planted your seeds, then neglected to water and fertilize your garden? If you're lucky, you might have a few peppers and zucchini after a few weeks, but you're more likely to have a few stunted vegetables or nothing except a few shriveled vines. A successful garden requires water and fertilizer.

So it goes with bowel flora. You eliminate the extraordinary bowel-disruptive effects of grains—gladin, gliadin-derived peptides, wheat germ agglutinin, indigestible D-amino acids, trypsin inhibitors, and others—then “plant” some desired species from a probiotic preparation or fermented food, but then fail to nourish them. It means that desired species may not proliferate, they may not outnumber and overpower unhealthy species such as E. coli, Staphylococcus aureus, Clostridium difficile, and Firmicutes. Unhealthy species are allowed to proliferate, thereby increasing intestinal permeability and resulting in higher blood levels of the bacterial byproduct, lipopolysaccharide, that is highly inflammatory. It also means that healthy bacteria fail to produce fatty acids, especially propionate and butyrate, that are required by intestinal cells for normal metabolism, heal “tight junctions” between cells (disrupted in conditions such as ulcerative colitis), and reduce potential for colon cancer. It also means that metabolic benefits, such as reduced insulin and blood sugar levels, reduced triglycerides, reduced blood pressure, and reduced visceral fat do not result—all because desirable bowel flora were not “fertilized.”

So what acts as water and fertilizer to bowel flora? What feeds them, allows them to proliferate and yield factors such as butyrate? Fibers. But not all fibers.

In a fascinating tale of symbiosis, the coexistence of microorganisms and Homo sapiens, a specific class of fibers, i.e., polysaccharides or polymeric sugars, that are indigestible to the human digestive apparatus but digestible via the enzymes expressed by specific bacterial species, allow all these beneficial health effects to occur. It means that food, chewed, swallowed, bathed in stomach acid, emulsified by bile, broken down into constituents by pancreatic enzymes, exposed to 20-some feet of small intestine, finally reaching the colon where most microorganisms dwell, contains little remaining nutrients to nourish bacteria. The desirable species that thrive in this unique environment are those that can digest the undigested remains of your meal—fibers. But not cellulose fibers, i.e., wood fiber, of the sort that dominates in grains and is found in bran cereals. Cellulose is essentially indigestible by both our own digestive apparatus, as well as the bacteria that humans are capable of carrying. (It is digestible by ruminants.)

The proper care and feeding of bowel flora therefore causes proliferation of healthy Bacteroidetes, Lactobacillus, and Bifidobacteria that produce bacteriocins that suppress growth of unhealthy species, metabolize fibers to butyrate that yields metabolic benefits, even improves bowel habits and allows you to have normal, healthy bowel movements without “crutches” like the bulk of cellulose fibers, laxatives, or enemas.

Is this evolutionarily appropriate? Is there precedent in human adaptation on this planet for such unique fibers? I ask this question because this is my litmus test for the suitability of any dietary strategy we consider. Recall, for instance, that grains were added 300 generations ago, or 0.4% of our time on earth, a mere moment in time ago. They are inappropriate for human consumption, now made worse by the genetic fiddlings of agribusiness. (I have to concede that grains do indeed have some fibers that have health benefits, such as arabinoxylan in wheat and beta glucan in oats, but they come with such undesirable other components that it is simply not worth it.) Yes, consuming such fibers is evolutionarily appropriate, as it dates back well over 8000 generations of human existence, predating even the appearance of the Homo species, even predating carnivory, as it was practiced by pre-Homo hominids, Australopithecus (especially “robust” strains). It is therefore deeply instilled (I almost said “ingrained”—acchhh!) into the adaptive physiology of our species.

So how do we obtain such indigestible fibers that nourish healthy bowel flora, so-called “prebiotics” or “resistant starches”? Well, do what a member of the Hadza of sub-Saharan Africa or Yanomamo of the Brazilian rainforest would do and grab a stick, stone, or bone fragment and dig in a field or forest for the underground tubers of plants. If you don’t want to do that, you can incorporate foods available in modern grocery stores that mimic such practices. Among the foods that yield such fibers:

- Green unripe bananas or plantains—with around 27 grams prebiotic fibers per medium sized banana
- Raw peeled potato—with around 20 grams per 3 1/2-inch medium
- Inulin powder—with 5 grams per teaspoon
- Bob’s Red Mill raw unmodified potato starch—8 grams per tablespoon
- Legumes, lentils, chickpeas, hummus—Around 3 grams per 1/4-cup. But we have to be careful here, as any more than this quantity and blood sugars start to climb to unhealthy levels.

(Thanks, by the way, to Richard Nikoley, the prolific blogger of the Free the Animal blog, who has done a spectacular job of providing meaningful discussions around the science behind resistant starches, as well as identifying the Bob’s Red Mill product as a convenient and available source.)

These are the most efficient sources, with lesser quantities in other below-ground vegetables. I pick one of the above foods and include them in a smoothie every morning along with, for instance, a cup of unsweetened coconut milk, some blueberries or other berries, a few drops of stevia, etc. If you choose the banana, peel it like an apple or chop off the ends and slit the skin, as it is very tough to skin when green. Chop both banana and potato coarsely before putting in the blender; a blender with a strong motor is advised.

The science that examines bowel flora composition tells us that 20 grams of such fibers yield substantial effects. While the average grain-consuming human obtains around 3 or 4 grams per day, us grain-deniers can fall below this and experience undesirable bowel and metabolic effects. Benefits begin around 8 or 9 grams per day, with maximal benefit likely around 20 grams. (Interestingly, there is anthropological evidence of intakes as high as 135 grams per day.) When new to this experience, start with no more than 10 grams fiber per day; more and abdominal pain and bloating can occur; build up over days to weeks. Full benefits, such as reductions in blood pressure and blood sugar, require 4 to 8 weeks to show themselves, likely due to the shifts in bowel flora species.

Every once in a while, a new strategy declares itself that yields unexpected outsize benefits. Vitamin D was that way, as well as wheat elimination. Now add restoration and management of healthy bowel flora with probiotic and prebiotic strategies to that list, strategies that acquire even greater importance in the grain-free lifestyle.