

FIBER FUELED, by Will Bulciewicz,  
Report by David G. Schwartz, MD, Part II  
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There may be millions of types of fiber in nature, which we have not yet studied, but we do know of 300,000 types of edible plants. Many of the soluble fibers in these plants cannot be digested by our 17 human glycoside hydrolases, but the bacteria have 60,000 enzymes that can digest these many varieties of fiber from a variety of plants.

So, what are these “miracle” postbiotic SCFA’s, mentioned Part I, and what do they do? The 3 major ones that are the most abundant and which do most of the work are acetate, propionate, and butyrate. Each type of fiber produces different mixes and proportions of these SCFA’s, each playing a different role in promoting health. It would be too laborious to look at which blend of SCFA’s could be used to heal which diseases. It probably will be the endeavor of pharmaceutical and supplement industries to patent or promote these specific treatments (my comment). The key to maximizing benefit is “to consume a diverse mix of plants, to get the benefits of *all of them.*”

The SCFA’s are not the only postbiotics, and fiber is not the only prebiotic (food for healthful gut microbes). Resistant starch in legumes, grains, potatoes, etc. are also acted upon by the microbes to produce SCFA’s, just as if it were a soluble fiber. Human breast milk has oligosaccharides that likewise are food for the bacteria to produce SCFA’s. Other prebiotics that are not fiber are also transformed into beneficial substances other than SCFA’s. Cocoa, green and black tea, pomegranates, apples, and blueberries have polyphenols, 95% of which are transformed into their active forms by the bacteria. Omega-3 fatty acids from walnuts act on the microbes to produce health-promoting postbiotic substances.

Fiber consumption increases the growth of friendly bacterial species, and it increases the diversity of species. As the beneficial bacteria, being fed, multiply, they also become more efficient in producing more SCFA’s with less fiber, thereby building momentum. And what is more, 10% of our daily calorie requirements are met with the SCFA’s.

The flip side of all this is that microbes starved by a low fiber diet lose their fiber-extracting capabilities, resulting in the breakdown of the protective lining of the gut, with susceptibility to disease. The author states that 7 of the 10 leading causes of death are caused by poor nutrition, mostly related to dysbiosis.

The SCFA butyrate heals the colon. It is fuel for energy for the colonic cells and makes the colonic environment more acidic, thereby suppressing inflammatory and pathogenic bacteria such as salmonella. Butyrate repairs the leaky gut by fixing the tight junctions between cells, thereby decreasing the release of bacterial endotoxins into the circulation. It also increases colonic motility and decreases the visceral hypersensitivity that causes pain in irritable bowel syndrome (IBS). So all that helps heal dysbiosis, which is at the root of most modern diseases.

The SCFA’s also work with the immune system as a crisis negotiator to cool down inflammation caused by the unrelenting release of bacterial endotoxins that stress out the immune system. SCFA’s inhibit NF- $\kappa$ B, IFN- $\gamma$ , and TNF- $\alpha$ , some of the most powerful promoters of inflammation that the body has. These SCFA’s also make the immune cells more tolerant of foods, decreasing food sensitivity and allergy. They communicate directly with regulatory T cells to prevent them from attacking the body’s own cells in the manner of autoimmune conditions such as inflammatory bowel disease (IBD),

rheumatoid arthritis (RA), etc. In short, the immune system is dependent upon SCFA's, and without them, it becomes "insecure, confused, paranoid, and weak."

What about cancer? We've known since the 1970's that butyrate, one of the SCFA's beneficial to the colon cells, inhibits histone deacetylases that allow cancer cells to reproduce. SCFA's also induce cancer cell apoptosis (cell suicide). A meta-analysis of 243 prospective studies by Dr. Andrew Reynolds, published in the Lancet, found that increasing fiber intake from the very low to medium intake up to 25-29 grams per day was protective against colorectal, breast, and esophageal cancer. Dietary fiber has been shown repeatedly to protect against colon cancer, the #2 cause of cancer deaths in this country. A prospective study of 1575 people with colon cancer showed that for every 5 grams of increased fiber there was an 18% lower risk of death from colon cancer, and an overall 14% decreased risk for all causes of death.

How about the #1 cause of death, cardiovascular disease? In the same Lancet study by Dr. Reynolds, fiber was associated with decreased body weight, less type 2 diabetes, lowered cholesterol, and reduced systolic blood pressure. We've known since the 1980's that fiber protects against type 2 diabetes, and modern studies show that SCFA – producing microbes improve blood sugar regulation.

The "lentil effect," is that when lentils (or any beans) are eaten for lunch, the bacteria are thus empowered to reduce the spike in blood sugar at the following meal, supper. The same holds true from breakfast to lunch. SCFA's also promote release of satiety hormone's. These SCFA's have also been found to protect against heart failure and hypertension, and by reducing the release of endotoxins from the pathogenic bacteria in the gut, reduce vascular inflammation.

Regarding the central nervous system, SCFA's improve the blood-brain barrier. Other studies have shown correlation of the leaky gut barrier with leaky blood brain barrier (my comment). People with brain fog have found tremendous improvement in clarity of cognition, including the author, from increasing fiber. Parkinson's patients have lower levels of SCFA's in the stool. Children have better focus and working memory on a high fiber diet. Dr. Dale Bredesen's work with Alzheimers Disease (see my report on The End Of Alzheimer's) incorporates maintaining a healthy microbiome.

Dr. Justin Sonnenberg compared the diets of the Hadza of Tanzania with that of Americans. The Hadza consume 100 grams or more of fiber per day and include 600 kinds of plants in the diet over a year. They have 40% more microbial diversity than Americans. African Americans have 65 times more colon cancer than rural Africans. Remember the large bowel movements and small hospitals?

Dr. Sonnenberg also demonstrated in a mouse study that the loss of microbial diversity could be passed on to the next generation.

Dr. Rob Knight created the American Gut Project in 2012, the largest and most diverse study of microbiomes in the industrialized world. He found that the "single greatest predictor of a healthy gut microbiome is the diversity of plants in one's diet." The consumption of 30 different plants in one week was the greatest predictor of gut microbial diversity. You could be a junk food vegan with poor diversity or a paleo dieter with lots of vegetables and great diversity. Dr. Knight's studies showed more SCFA's with increased diversity of plants eaten.

Plants also have many phytochemicals, especially brightly colored plants, and many organic plants also have probiotics which, when eaten, can communicate with our own gut bacteria.

Dr. Bulciewics says that beans are close to being a “superfood.” Excess body weight, blood pressure, cholesterol, blood sugar, and hs-crp, a marker for inflammation, all drop with no change in calories eaten when beans are added. Legumes and whole grains are part of the diets in all 5 of the Blue Zones, areas with extreme longevity, mentioned in last month’s article. Beans can produce less gas the longer you eat them. His “golden rule” is “Diversity of Plants. Diversity of Plants. Diversity of Plants.”

He also recommends lots of fermented foods, not just for their bacteria, but because the fermentation changes the fiber so that it adds more variety to the fiber.

His favorite highly recommended foods are illustrated with the acronym FGOALS.

F – Fruit and Fermented Foods

G – Greens and Grains

O – Omega 3 super seeds

A – Aromatics, onions, garlic, etc.

L – Legumes

S – Sulfurophane from broccoli, cabbage, kale, and other cruciferous vegetables.

A large part of the book is devoted to recipes and a detailed 4 week plan of gradual introduction of more varieties and amounts of fiber from organically raised plants. For the average person who does not get much fiber, it is recommended to gradually make the change, to give the bacteria and enzymes time to adjust. Just like building muscle, it is best to start workouts gradually. Especially if severely constipated, check out the cause of the constipation first, and do not suddenly increase fiber. So the reader is advised to actually get the book and follow the details of the 4 week plan. If you already have a lot of knowledge about foods and experience with food preparation, I suppose you could make a detailed self-made plan for a step by step introduction of more fiber. Just be prepared for some increased gas production with every step, until the goal is reached.

The author addresses some concerns some people have about plant based foods, such as lectins, fructans, gluten, FODMAPs, etc. Regarding the concept of lectin incompatibilities, some test tube and animal model studies in the 1970’s and 1980’s brought up questions of lectin incompatibilities of many foods with the gut lining, etc., and that they could cause a host of inflammatory conditions. Lectins are certain protein compounds that bind to carbohydrates. They are ubiquitous in nature – fungi and other microorganisms, plants, animals, and humans. Some foods have higher amounts of lectins than others. Cow’s milk, eggs, beans, peanuts, many grains, and many vegetables have high amounts. In order to significantly reduce lectin consumption, one would have to eliminate all grains, beans, nuts, fruits, and many vegetables.

These worries have not been confirmed in human studies. In fact, studies have suggested that the lectins themselves from wheat, buckwheat, soybeans, mushrooms, bananas, fava beans, and jackfruit are protective against cancer. Human studies have *repeatedly* demonstrated that legumes and whole grains reduce weight, decrease blood pressure, lower lipids, decrease insulin resistance, lower inflammation, protect from cardiovascular disease and cancer, and increase life expectancy. My comments regarding whole grains is that all grains have been getting bad press because of glycemic index, insulin resistance, obesity, diabetes, dementia, etc., but many of the recommendations for cutting out all grains from the diet are made with sloppy categorizing of grains without distinguishing between processed and whole kernel grains. Pasta, bread, anything made with flour, even if it is “whole grain flour,” is insulinogenic and can lead to many of these aforementioned problems. Don’t call them “whole grain,” because they are not whole kernels. It makes a big difference. If you cook the kernels,

the fiber slows the digestion and absorption of the glucose produced. These are the whole grains that promote health.

What about gluten? This is a difficult to digest protein found in wheat, barley, and rye. A small percentage of people get celiac disease if they have the HLA DQ2 or DQ8 genotype mutation, and if they get exposed to gluten, and if they have dysbiosis, which most people have who do not have adequate fiber. A blood test for antibodies to gluten, and an intestinal biopsy can confirm celiac disease. This is a risky autoimmune condition and requires 100% abstinence from any gluten particles. This can lead to a whole host of health problems, including gastrointestinal disorders, neurological problems, iron deficiency anemia, osteoporosis, thyroiditis, and small cell intestinal T-cell lymphoma.

On the other hand, a large proportion of people have non-celiac gluten sensitivity, similar to other food sensitivities, not an autoimmune condition, and they find improvement in health by eliminating wheat, barley, and rye. Most of the gluten people usually consume is from processed foods, from flour. Does the difficulty with gluten come from dysbiosis and not eating the grains in their natural state? (my question). The author suggests that maybe the problem comes from fructans, which are found in gluten containing grains, especially if the symptoms are g.i. (gastrointestinal) symptoms, such as bloating, gas, abdominal pain, diarrhea, constipation, etc. Researchers gave people oatmeal bars that had concealed within, either a placebo, gluten, or fructans. These people had had g.i. symptoms which they attributed to gluten sensitivity. The ones who ate the gluten-containing bars had a decrease in their usual symptoms, and the ones who ate the fructan-containing bars had a worsening of their symptoms. So we have some uncertainty about the role of gluten in causing this sensitivity.

What about fructans? They are a part of a group of substances called by the acronym, FODMAP, meaning Fermentable Oligosaccharides, Disaccharides, Monosaccharides, And Polyols. These are fermentable (by gut bacteria), because many are not digestible by human enzymes, and others are acted upon by certain strains of bacteria that may be in overabundance (dysbiosis).

Oligosaccharides and galacto-oligosaccharides are complex sugars in beans that commonly create gas, and fructans are in gluten containing grains and some fruits and vegetables. A disaccharide is lactose in dairy products. A monosaccharide is fructose, found in fruits, some vegetables, honey, and corn syrup. Polyols are the sugar alcohols, mannitol, sorbitol, erythritol, xylitol, etc., found in some artificial sweeteners and some fruits and veggies.

So the diversity of gut bacteria, i.e. a healthy microbiome can act on these FODMAPs to do the job of producing beneficial fatty acids, without symptoms. With dysbiosis, the wrong bacteria get hold of these fermentable substances to produce methane, which makes constipation, and hydrogen peroxide, which results in diarrhea, for some examples.

So then, what to do for symptoms from FODMAPs? The low FODMAP diet developed at Monash University in Australia was designed to restrict FODMAPs for 2-6 weeks, followed by a period of time in which these foods were slowly re-introduced. Some people have specific FODMAPs that are particularly problematic.

Now, the point is not to eliminate FODMAPs permanently, because these foods are the prebiotics that we so vitally need to feed the good bacteria, which produce our fatty acids. So the author recommends the gradual re-introduction of these foods. I would add, that it would be good to correct the dysbiosis meanwhile, by adding probiotics with 100-200 billion organisms per dose to help with the digestion of these substances, eating more of the other fibers that do not contain FODMAPs, eating

already fermented foods, and avoiding alcohol, before re-introducing these foods. The author has a list of FODMAPs at his email, [fodmap@theplantfedgut.com](mailto:fodmap@theplantfedgut.com).

Dr. Bulciewicz also warns that if someone has an actual allergy to a food that causes hives, breathing difficulties, swollen throat, etc., to never re-introduce those foods. I would add, unless a properly trained allergist desensitizes those foods, and if the person has an Epi-pen or comparable injector.

The author doesn't worry much about nutritional deficiencies from phytates in grains blocking absorption of nutrients, oxalates, salicylates, lectins, etc. or too many carbs. There are special situations where people need to pay attention to oxalates, salicylates, etc. When people are eating a low fiber diet, yes they need to pay attention to carbohydrates, processed foods, etc. But the more fiber one eats, these issues fade into the background as the beneficial bacteria take over. I would add that if a person is drinking many spinach smoothies regularly, oxalates can be a problem. Any one food taken to extreme can be a set up for imbalances and consequent health problems.

The author has a little more confidence than I do, so far, in seeing the fiber as the main or only factor in these issues. He says that the variety of fibers, that's it. No more counting calories, carb to fat ratios, no diet foods, no restricting portion sizes, etc. He implies that you can eat all you want, as his wife did when he first dated her, as she set him on this fiber trajectory. But he also recommends, eat until you are 80% full. Overeating does not fit with any food plan. I used to have to watch my calorie consumption very carefully to not gain weight, and beans would cause much foul-smelling gas. Since I followed his advice and increased the varieties of plant based foods and increased my bean consumption, I had a little more gas to start with, but after a few weeks, the gas subsided to below my previous baseline. I also increased my quantity of food eaten without gaining weight, but found that I also eventually had to limit portion sizes. No overeating.

To me, this book is a game changer. It cuts through many of diets and ways of eating that make things sound so complicated. Recognizing that not one size fits all, some people, even if temporarily, need special, augmented, or restricted diets; but if there is one food plan that applies almost universally to everyone, it is high fiber from diverse sources. What we hear often when fiber is recommended is to take a fiber supplement, and to help with dysbiosis, take a supplement of probiotics. These supplements are helpful, and Dr. Bulciewicz discusses these various supplements, but too often the main course, or the "main event" is overlooked. The first thing to do is to feed the gut microbiome with the food it needs to help keep us healthy, and to supplement as necessary. If we don't do that, we will have limited success. This is consistent with the "Food Rules" of Michael Pollan, about which I wrote, in the archives. Remember, he said, "Eat food. Mostly plants. Not too much." Seven words said it all. I plan to continue studying [Fiber Fueled](#) for my personal health as I keep on modifying my diet to add variety. I plan to read more from his colleague, Dr. Robynne Chutkan, who wrote [The Microbiome Solution](#).