

eBook

Holistic Nutrition for Cystic Fibrosis

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I. Introduction

Although your doctors undoubtedly want what's best for you, most mainstream docs are not well educated in the role of nutrition in health, and are often miseducated in school with outdated and incorrect information. In the US, a doctor can graduate medical school with one or less classes on nutrition! The synthesis of the latest nutritional research and elements of the wisdom of traditional diets is proving to be more effective in treating chronic disease than what the reductionist Western medical system espouses. *All disease is either caused by or exacerbated by poor nutrition.* If we want to get at the roots of our problems and treat the causes rather than the symptoms, we must look at what is most fundamental to life: eating. Our bodies are literally made up of what we ingest, so it makes complete sense that the kinds and qualities of foods we eat have a direct impact on how we feel and function.

Unlike most chronic diseases in America that are caused by destructive eating habits and lifestyle choices, CF is not directly caused by poor nutrition (though its epigenetic expression may have been influenced by our parents' or grandparents' diet), so we cannot be "cured" by eating a perfect diet. However, CF is *certainly* exacerbated by poor nutrition, and many of our symptoms can be improved or completely relieved by good nutrition. I believe that because our bodies are less resilient than the bodies of non-CFers, we are even more sensitive to poor nutritional choices than most people. Thus, it is absolutely imperative for CFers to pay attention to our diets, to eliminate irritating foods and toxins, and to add in medicinal foods and supplements.

Every one of us has a unique disease, so there is no single diet that will heal us all equally. However, there are some simple rules that all of us can follow as guidelines for finding out what foods and eating habits are most nourishing and healing for our particular bodies. I will outline these food rules in the following sections and include more in-depth information on these topics in further blog posts. Some of what our CF docs tell us to eat ends up being exactly the opposite of what we should be eating on a healing, anti-inflammatory diet, and I will explain this with modern science and ancient principles of natural healing. The wisdom of traditional medical systems like Ayurveda and Traditional Chinese Medicine as well as folk cultures throughout the world has much to offer us in the way of knowing what is healthy and not healthy to eat. Modern mainstream medicine rejects this fact, believing old knowledge is inferior to new knowledge, which is not always true. As we study ancient dietary wisdom and experiment with our own diets, we must keep in mind that empirical evidence (i.e. our personal symptoms and the results of blood tests) is more useful information than modern theories that are not backed up with solid evidence. Paying close attention to what our bodies are telling us helps us trust our own authority and resist unfounded medical theories, from modern medicine and other sources as well. The body always tells the truth! That said, we should always be open-minded and non-dogmatic about medical information, seeking truth from whatever sources are most valid, including mainstream medicine.

By the way, *these guidelines are useful for all of us, CFers and non-CFers alike*. Many of us are suffering from the consequences of eating the Standard American Diet (SAD) or some iteration of it--the most disease-producing, toxic diet ever eaten in the history of life on earth (I'm not sure I'm being dramatic enough here). The most common causes of disease and death in the US (heart disease, stroke, diabetes, cancer, etc.) are strongly connected to diet. We can eliminate or reduce a lot of disease symptoms simply by eating healthy foods in the right amounts, of the highest quality, at the right time, in the right combinations, and in conjunction with exercise and awareness practices. Let's get started!

II. Food is Medicine

Eating is a complex and sacred act that involves the mind, body, and spirit. Eating is a process by which the outside world becomes internalized; a process by which our flesh is created and transmuted by Nature. The modern mechanical worldview sees eating food as nothing more than fueling up a machine, but this is deeply, profoundly misguided. Every time we sit down to eat, we have the opportunity to align ourselves with Nature and give gratitude for its abundance. In my view, that is the ultimate goal of human life--to align ourselves with Nature--and we may use our meals as ritual practice of that communion.

Yet for those of us with digestive imbalances, it can be difficult or even painful to eat, leading to physical and/or psychological discomfort. Here I'd like to address not just *what* to eat in order to reduce this discomfort, but *how*. There are certain eating habits and practices we can adopt to improve our digestive and absorptive capacities, such as paying attention to food combining, taking herbal bitters before meals, drinking more water, eating smaller meals, and so on. That way we may take full advantage of the sacred foods that we ingest.

Food waste is a huge problem in modern industrialized society. In the US, approximately [30-40% of food is wasted](#). This is truly unacceptable, especially at a time when a growing number of people are going hungry due to the poverty caused by capitalism. Not only that, but the food that is wasted is often thrown in the trash and dumped into landfills instead of being composted to make new soil or fed to livestock. This must change, for it is extremely disrespectful to our fellow humans and to Nature as a whole.

Food waste is not just external, however--it can occur internally as well. Food waste can also occur when it happens when we don't properly digest and absorb what we put into your mouths. Improperly digested food can more more than wasteful, it can also be harmful to the body. In Ayurveda, the traditional medical system of India, it is believed that improperly digested food leads to the formation of a toxic, sludgy substance in the gastrointestinal tract called *ama*. Similarly, Dr. Samuel Gee, a famous American pediatrician in the early 20th century, wisely stated: "We must never forget that what the patient takes beyond his power to digest does harm" [1].

Before I discuss *what* foods to eat in order to improve digestion and absorption, I'd like to talk about *how*: what habits and techniques can we use to improve our assimilation of the foods we eat? Here are a few suggestions.

1. Food Combining

For those with sensitive digestion or issues with malabsorption, food combining can be very helpful. Different foods require different digestive secretions in order to be broken down and assimilated, thus the food combining rules I outline below suggest eating combinations of food types in order to take advantage of specific digestive secretions and coherence of digestive transit time. Careful food combining may be particularly helpful for those who have digestive trouble or malabsorption, particularly gastroparesis, constipation, diarrhea, gas, cramping and bloating, heartburn, and stomach aches. In the first stages of healing my gut many years ago, I found food combining to be very helpful for relieving digestive distress and improving absorption.

The basic rules are:

A. Eat protein alone or with acidic vegetables (e.g. sauerkraut), or vinegars, or with green/leafy vegetables. (For example, ground beef with a side salad, steamed broccoli, or sauerkraut/kimchi.)

B. Eat fats with:

1. Vegetables of any kind including starchy ones. (For example, vegetable stir-fry with a tahini sauce, butter, or coconut oil; or a sweet potato with butter.)

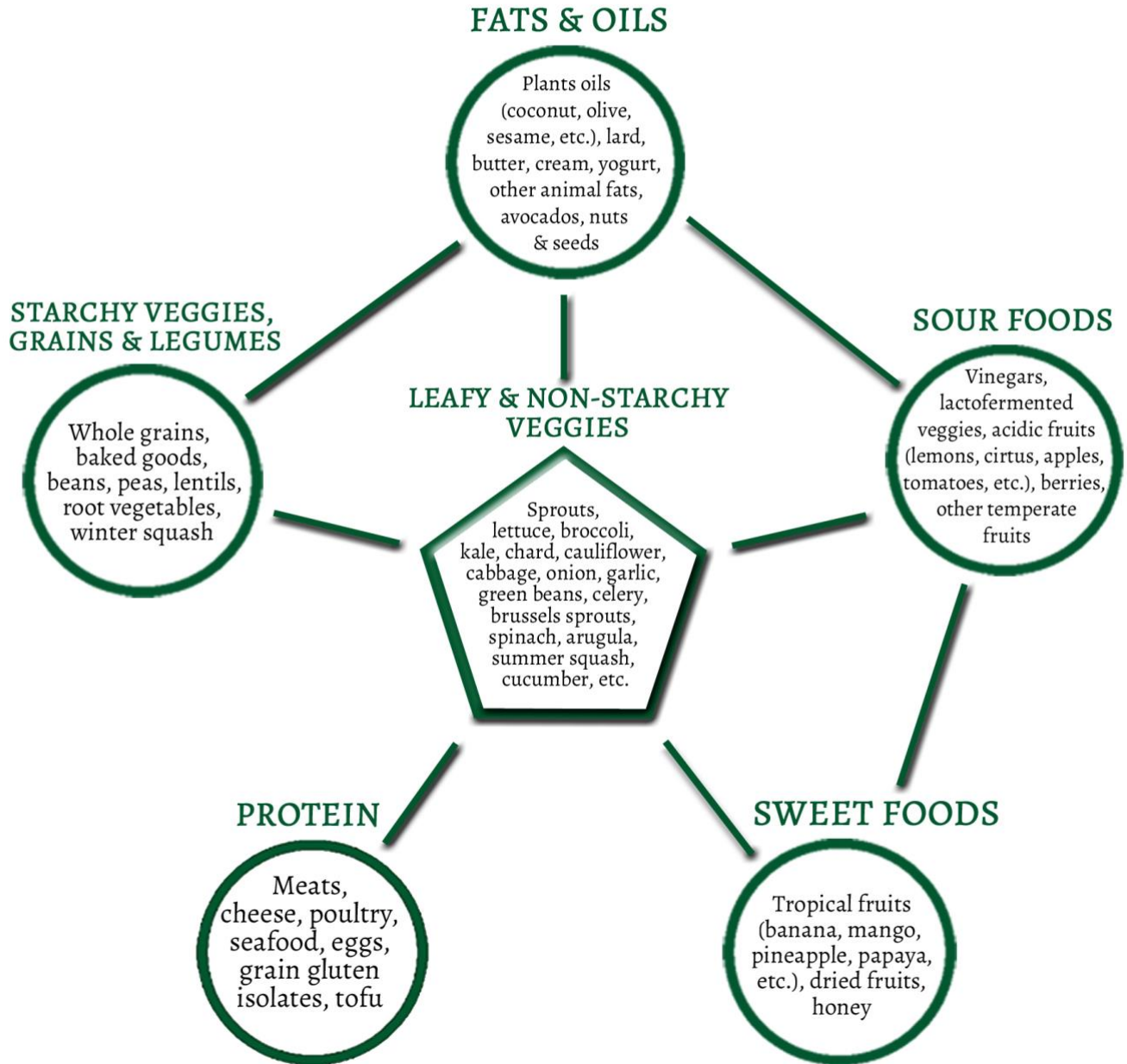
2. Acidic or subacidic fruits. (For example, granny smith apple with sunflower seed butter; oranges, blueberries, or apples with whole-fat yogurt.)

3. Grains. (For example, steamed brown rice with butter or olive oil added.)

C. Sweet fruits (e.g. bananas, figs, most tropical fruits) should be eaten on their own or with other types of fruits.

These suggestions are based on the suggestions in Paul Pitchford's book *Healing with Whole Foods* [2] who uses the food combining principles of Chinese Medicine. Please note the special combinations he outlines at the bottom. The only additions/modifications I have made to this chart is that I consider nuts and nut butters to be fats, since most contain at least two times more fat than protein. When fat and protein are equal (e.g. cheese) or when protein is slightly greater, I consider that a protein. I have also found that some subacid fruits like apples and berries combine perfectly well with fats like nuts or nut butter.

FOOD COMBINING FOR COMPROMISED DIGESTIVE SYSTEMS



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Healthy people with robust and resilient digestive system can be more liberal with their combinations. The goal is for us to eventually improve our digestion enough that we may combine our foods freely without any negative impact.

Food combining takes advantage of similar needs of digestive secretions. Proteins require stomach acid to be digested, so it's a good idea to eat them with sour veggies like lactofermented or pickled vegetables which have a low pH (they are more acidic).

By the way, there is a modern diet theory called the "alkaline diet". The above information has nothing to do with that diet theory. I do not believe in or use the alkaline diet theory because it uses scientific terms such as "acid" and "alkaline" in non-scientific, inaccurate ways that confuse the issue. That diet theory uses the words acidic and alkaline as metaphors for "bad" and "good" foods to eat based on the idea that they change the pH of your body and blood. Nothing can change the pH of your blood except ketoacidosis, which is a life-threatening emergency. You can easily change the pH of your urine by changing your diet, but urine pH doesn't say much about your overall health. Urine pH does say something about your vulnerability to developing kidney stones or urinary tract infections, however (i.e. in people with UTIs you want the urine to be *more* acidic to combat the infection). Furthermore, one of the issues with the Standard American Diet is that it makes the colon too *alkaline*. An acidic colon means that you have plenty of helpful lactic acid-producing bacteria in there such as Lactobacillus species. An alkaline colon means that you have low microbiota diversity and possibly dysbiosis. A way to increase healthy colonic acidity is to eat more vegetable fibers as probiotics to feed our beneficial gut bacteria.

2. Bitters Before Your Meals

For hundreds of years people have taken bitter tastants (i.e. preparations made from bitter roots and herbs) before meals to help prepare the digestive system for a meal. Tasting bitterness before eating triggers the release of the necessary elements for proper digestion, including bile from the gallbladder, pancreatic enzymes, hydrochloric acid in the stomach, pepsin (an enzyme released in the stomach that breaks down protein), and gastrin [5]. The bitter taste is common in wild plants, often signifying compounds that are both helpful and harmful, including alkaloids. The bitter flavor can tell us about the presence of nutritious, anti-inflammatory compounds in plants which help us adapt to our environments. Humans have coevolved with bitter plants for so long that our physiology has become dependent on them for proper digestion. At no point in history until the last 100 years was the bitter flavor been absent from the human diet. The bitter taste is almost completely absent from the modern Western diet because it is a challenging flavor, and since this dietary change has occurred we are seeing a rapid proliferation of digestive and immune disorders in the West. My teacher Guido Masé has taught me that one of the solutions to the epidemic of modern digestive disorders is to reintroduce bitter flavors back into the diet [6]. In fact, in Europe it is still traditional in many cultures to drink bitter herb-infused teas or alcoholic beverages before or after meals, or to eat a salad of bitter greens like arugula before meals. These traditions have been forgotten in the US, but we can reinvigorate them now. In East Asia, pickled vegetables like kimchi are often used in a similar fashion to stimulate digestive secretions before meals. Bitters can be used after meals as well to prevent indigestion and post-meal heartburn. It is my firm belief that improving digestive

secretions is a big missing puzzle piece to the universal CF struggle to maintain weight. Increasing the calorie content of the diet may not be effective if the ability to absorb those extra calories is compromised. In my own life, I have noticed that improving my digestion has done more to improve my ability to maintain weight than increasing daily calorie intake, and bitters have played a big role in this.

Commonly used bitter herbs include burdock, dandelion, artichoke leaf, yellow dock, motherwort, gentian, and wormwood, but there are hundreds of bitter herbs to choose from. A typical dose is one dropperful (1 mL) of the tincture placed directly on the tongue or sipped in a little water 10-15 minutes before eating. We need to be able to taste the bitterness in order for it stimulate digestive secretions via central nervous system enervation. Many health foods stores and co-op now sell little bottles of bitters in the supplements aisle, or if not you can order them online from plenty of places. A really great company that specializes in bitters is [Urban Moonshine](#). Also check your local farmer's market - they are all the rage right now where I live. It is also very easy to make your own bitters, and one of the most excellent bitter herbs is free and widely available: dandelion! I make my own bitter tinctures with vinegar instead of alcohol. All you do is chop up your herbs (fresh or dry) and in a glass jar cover them with apple cider vinegar or vodka. Steep for 2-4 weeks, strain, and keep them in a little dropper bottle for easy access. I keep my bulk vinegars in the fridge to prevent a mother from regrowing.

Bile Excretion and Fats

Bitter herbs and the bitter taste in foods stimulates the liver to produce bile and the gallbladder to excrete it. Bile is a critical part of fat digestion, as it emulsifies fats (breaks them up into tiny globules) so that lipases have an easier time breaking them down into triglycerides for absorption. Emulsification needs to happen before enzymes can have an optimal effect on dietary fats. Some CFers may have trouble getting bile out of the gallbladder and into the intestines either because the bile duct may be clogged with mucus, or because the small intestine is inflamed and the end of the bile duct has been swollen shut. If stools are consistently gray or light colored (e.g. tan, yellow, orange, or light brown) this means that there is not enough bile in the stool because bile contains pigments that darken our stools. Stools can be light colored if the diet does not contain enough bitterness to stimulate bile flow. After working with many CFers it has become clear to me that bile secretion is an issue for many of us, possibly due to overall digestive inflammation, lack of bitter tastes, or liver/gallbladder disease. It has recently become popular for CF doctors to prescribe PPIs to make pancreatic enzymes work better (according to the theory that the CF pancreas has a hard time secreting bicarbonate which is supposed to alkalize the small intestine so that enzymes can be activated), but given the many negative side effects of using PPIs I feel it is smarter and more effective to improve fat absorption in CFers is to encourage proper bile production and flow.

There are two special scenarios that I want to discuss in relation to bitter supplementation. The first is if there is currently a large gallstone blocking the duct that lets bile flow into the small intestine. This may be the case if the stools are acholic (chalk-colored due to total lack of bile) and if eating fats will causes significant pain in the right abdomen just under the ribs. Gallstones are diagnosed by imaging such as ultrasound or CT scans. Gallstones can be

dangerous as a blocked gallbladder can rupture, which is a life-threatening emergency. In this situation, bitters should not be used because encouraging more bile flow could cause the gallbladder to spasm leading to pain and possible rupture. However, if you have a history of small gallstones or sludge in the gallbladder, then taking bitters regularly can help keep that bile flowing regularly enough that stones can be passed and/or prevented. If stools are gray or light colored but there is no history of gallstones and no associated pain, then this could be caused by deficient bile flow blocked by inflammation where the end of the bile duct meets the intestine, or a lack of bitter foods in the diet. In this case, using bitters with every meal will help. The second special scenario I want to mention is for those without a gallbladder. Surgical removal of the gallbladder is done too often when the organ becomes even a little bit problematic (docs seem to have a policy of "if in doubt, take it out!") mostly to prevent the formation of gallstones in the those who have a history. If only those docs knew about the power of bitters! But if you don't have a gallbladder, for whatever reason, using bitters before meals is even more important. For these individuals, using the stronger bitters like gentian or motherwort t least 10-15 minutes before meals (no less) is going to be important because we now have to rely on the liver to put out enough bile on demand, which needs more time to act and a stronger stimulus.

You can work your way up to the stronger herbs as you develop a taste for it. A taste for bitter herbs is acquired the same way as for coffee or chocolate. I started with dandelion and burdock because they're the mildest and safest, but I now I find that I like the stronger bitters like gentian, barberry, and motherwort. Motherwort is part of my morning tea blend, and I love the flavor!

3. Smaller, Simpler, More Frequent Meals

When I was healing my gut I found that I was able to digest more quickly and eat much more throughout the day if I ate smaller and simpler meals more frequently throughout the day. If you have a need to gain weight, one part of your strategy could be to eat very simple, small, nutrient-dense, and high-calorie meals frequently throughout the day. I often recommend clients in this situation to eat either a "fat meal" or a "protein meal". Every meal should incorporate one of the these two macronutrients, but if you're digestion is not robust then it's advisable not to take both protein and fat in the same meal. I used to make my larger meals "fat meals" because fat combines with more things than proteins (as outlined in the chart above) and fat is more calorie dense than proteins or carbohydrates (i.e. 1 gram of fat gives 9 calories, 1g of protein or carbs gives 4 calories). I find that fats digest the slowest, especially for people with fat malabsorption) while protein and carbs digest more quickly. Starches and complex carbs are never the basis of a meal, they are only a complement, and only taken in combination with fats. I add leafy greens to almost every meal in one way or another, in a stir fry, salad, or smoothie/shake. Eating small and frequent meals is also one way of monitoring and controlling blood glucose.

4. Glycemic Load and Carb Counting

Having an understanding of the concept of the [Glycemic Index](#) and glycemic load is very important for CFers due to our vulnerability to diabetes and endocrine issues, as I discuss [here](#). The glycemic index/load is a tool to prevent carbohydrate-containing meals from spiking the blood sugar, and rates certain foods by how quickly they increase the blood

sugar. Having high blood sugar for a prolonged period of time can contribute to many problems including inflammation, infection, tissue degradation, hemoptysis, etc as mentioned [here](#). Using the glycemic index is the first step towards becoming more aware of and improving the carbohydrate content of our diet.

There are two important pieces to improving the glycemic index of foods. First, adding fats to meals with carbohydrates slows down the break down and absorption rate of those carbohydrates in the small intestine in order to prevent spikes in blood glucose. I have found, however, that this only helps so much. If a meal is very high in carbs there is essentially nothing to significantly prevent a spike in blood sugar, with the possible exception of intense exercise immediately after the meal. Secondly, fiber also slows the absorption rate of carbohydrates. But again, the *load* (serving size) is the more important factor. Eating 1 cup of brown rice will not spike the blood sugar as high or as quickly as 1 cup of white rice, but both will lead to sugar spikes in people with poor blood sugar control. How strict one must be in the use of the glycemic index versus carb counting and carb restriction depends on the severity of the glucose intolerance or diabetes. For diabetics, just paying attention to the glycemic index or load is not enough.

For individuals with unstable blood sugar, hypoglycemia, hyperglycemia, or diabetes of any kind, the most effective intervention tool is carb counting and carb restriction. The goal here is to ask the pancreas to produce less insulin overall, because it's the pancreas that is malfunctioning here. Putting less stress on the pancreas can bring more stability to the blood sugar overall. In addition, if you are a diabetic dependent on insulin, carb restriction can reduce the doses of insulin you may need (discuss this with your endocrinologist). As I became more glucose intolerant and more prone to reactive hypoglycemia over the years, I found the glycemic index alone was not enough to prevent spikes and crashes. Eventually I had to strictly control my carbohydrates and only eat high-fiber carbs from whole low-starch vegetables. Not every CFer will need to do what I do, but I want to mention that your needs for carb restriction may change over time and according to what pharmaceuticals you use (my glucose control got worse after beginning the Vertex CFTR modulators). I no longer need to take insulin now that I am on a low-carbohydrate diet, but this may not be possible for certain people with CF--every situation is different!

5. Eat Warm and/or Cooked Foods

For those with weaker digestion, eating cooked or warm foods is very important. Cooking many foods helps break them down so that they are more easy to assimilate and absorb. Most traditional medical systems encourage sick people to only eat warm and cooked foods. Warming foods brings the temperature up to body temperature, which improves GI transit and assimilation speed. If our digestion is poor, we may see uncooked foods in the stool such as vegetables, lettuce, beans, seeds, etc. This is an indication that the food needs to be broken down more. For people with weak digestion soups, stews, and warm purees are ideal. Avoid cold or raw foods such as salads, raw vegetables, yogurt, milk, ice cream, smoothies or shakes. Adding mild spices such as turmeric and ginger to foods can improve the energetic temperature of foods and speed up digestive capacity.

6. Chew Food Thoroughly

Chewing foods thoroughly breaks them into small pieces and mixes them with adequate saliva. Saliva contains amylases which are enzymes that break down carbohydrates. If there is dysbiosis, undigested carbohydrates can allow pathogenic bacteria to ferment upon them higher up in the gut. Proteins must also be thoroughly chewed to stimulate stomach acid secretion and to allow small food particles to mix with stomach acid thoroughly. Proper break down of proteins is critical to preventing leaky-gut mediated molecular mimicry, as I discussed [here](#). Eating slowly and mindfully can be a meditative practice as well, and be a necessary reprieve from a busy day. Meal time is sacred time where we give thanks for the life that we are consuming.

7. Take a walk

Taking a gentle walk after eating a meal, especially a big meal, can help get the digestive system moving and improve peristalsis (the constant movement of the GI tract). By taking a walk we're getting the blood circulating throughout your entire body including your internal organs. One of the reasons for the common phenomena of "food coma" (tiredness after meals) is that the body brings a lot of blood to the digestive system to begin breaking down foods, reducing circulation in the rest of the body. This can lead to heavy limbs and mental tiredness. A simple solution to this is to go on a walk after meals, which will increase circulation to the rest of the body and assists us in burning some carbohydrates. Hyperglycemia also can cause tiredness, and because exercising muscle can suck up blood glucose without the need for insulin, exercise can help prevent or reduce hyperglycemia. Regular exercise also increases insulin sensitivity. Moving our bodies, getting fresh air, and being outside is good for our spiritual and mental health as well. It has a calming effect on the nervous system, and can help us move into the parasympathetic "rest and digest" mode. The most helpful thing to calm me down when I'm stressed out is to go for a walk. I believe one of the major causes of the epidemic of mental illness, especially anxiety, in our culture is that people don't get outside enough! This might be called [Nature Deficit Disorder](#).

8. Keep a Food/Health Journal

It can be very useful to keep a journal of you've eaten, when, what happened during your breathing treatments, what your sputum looks like today, what your energy is like, what meds you've taken, what your poops look like, your exercise, menstrual cycle, moods, and so on. I believe that tracking this information is an important part of being an empirical self-healer. Journaling helps us track trends and link symptoms to causes, which can very often be elusive because life has so many changing factors! Health journaling has been an invaluable tool for me, especially when I was first beginning my healing journey. While I am not a fan of calorie counting, I have used an online app called [Cron-o-meter](#) to help me keep track of carbohydrate intake as I was beginning my low-carb/ketogenic diet.

9. Drink More Water

Dehydration and lack of thirst is common in CF. I'd also say dehydration is common in the general population as well! In CF this may be due to an imbalance in the CFTR channel which regulates the amount of sodium and other electrolytes in the body. The sodium level in the blood is one mechanism by which the body regulates the urge to drink. CF docs often encourage patients to eat extra salt to correct this deficiency. At first dehydration is subtle,

but if unaddressed for longer periods it can lead to many problems including muscle cramps, kidney stones, urinary tract infections and other urinary issues, gout, constipation, and decreased ability for the liver and immune system to flush out its garbage. I now take hydration much, much more seriously since having a series of kidney stones which required surgery. Nephrologists recommend drinking at least 70 oz. (2 liters) of fluids per day to allow the body to flush out all its systems properly. It is also important to drink even more water than normal when we have an infection, as the immune system needs to get rid of the "trash" consisting of killed pathogens by flushing them into the blood, lymph, and eventually urine and stool. Being dehydrated prevents the body from "taking out the trash" in an efficient manner, and you might experience this in terms of lymph node swelling, dark urine, or slowed recovery from infection. The goal is to drink enough water that the urine is clear to straw-colored. Your kidneys will thank you!

The volume water we drink needs to be balanced with intake of certain important electrolytes including calcium, sodium, potassium, chloride, and magnesium. If you are deficient in one or more of these important electrolytes, or if there is an imbalance in their ratios, you may experience muscle tension, cramps, heart palpitations, or constipation. Well water or spring water usually contains naturally occurring electrolytes, but tap water is often deficient in electrolytes. Adding an electrolyte powder or liquid to your water is an easy, affordable solution. I also take magnesium capsules when needed. Fresh fruits and vegetables contain many electrolytes, and adding salt to the diet is a good way to get enough sodium. Choose electrolyte mixes with zero added sugar or artificial ingredients, like [Electromix](#). I discourage people from using most electrolyte drinks available, such as gatorade, because they contain sugar and many artificial ingredients. A delicious home-made electrolyte drink is switchel, an old-time New England drink used in the summer haying season. The recipe is lemon juice, a little maple syrup, salt, and sometimes ginger added to water. It's delicious! Naturally lactofermented pickles are another great way to get in some electrolytes. Coconut water is another excellent choice.

10. Eat local, seasonal, and climate-appropriate foods

Eating locally grown and produced food is not only good for the environment and the local economy, but it is also biologically appropriate. Eating local food reduces the carbon emissions associated with transporting foods, and supports local farmers and small businesses. It also improves food security and avoids disruptions in supply chains which will increase as climate change and economic upheaval worsens. Eating seasonally is biologically appropriate because in general the foods available in certain seasons support the body best in that climate. For instance, when it's hot in the summer, eating fruits and vegetables are important to staying cool and hydrated, because most fresh fruits and vegetables are moist and cool in quality. In contrast, in a cold winter climate, meats and root vegetables are most appropriate because they are more calorie-dense and having a warming temperature which we need to stay warm and healthy in cold weather. Eating a lot of raw fruits and vegetables in the winter will make us cold and feeling depleted. Eating plants that grow in other climates or seasons, like eating bananas and mangoes during a Vermont winter, is not only harmful to the environment (because it requires carbon pollution and fossil fuels to transport those foods across the world) but it also imbalances our bodies. So I like to think about what the land is offering me in the season that I'm in,

which informs me about what is most appropriate to eat at that time. All traditional peoples change their diets according to the seasons, and we should too! Eating according to the seasons also benefits us in non-physical ways, aligning our hearts and minds with the Land, and noticing how external patterns in Nature reflect inside our own bodies.

11. Gratitude

Life is sacred, and that includes the life of our food. We eat animals that had mothers, fathers, siblings, and friends. We eat plants that began as tiny seeds and grew as they were filled with the energy of the sun and the nutrients of the soil. We are animals, and we must eat life in order to live. This is natural and good. Part of being deserving of these gifts Nature gives us is to be grateful for them. At every meal I give thanks for the lives of these individuals that I eat, recognize them as my equals, and contemplate how important their existence is to our ecosystems and our souls. In this time of scarcity and inequality, having anything to eat is a privilege we can be grateful for. Gratitude is an important piece of feeling linked with the world as a whole and having compassion for the other sacred beings on Earth. Nature is constantly giving to use freely; instead of taking taking taking and giving nothing back, as Western culture has educated us to do, giving our thanks and respect to the non-human beings on Earth is an important step towards realigning ourselves with Nature, especially the Nature that we eat! From there we can strengthen these relationships through growing and tending our foods directly y having a garden or raising animals ourselves. We can learn how to steward land, protect native species, and conserve ecologically important places. These are excellent ways to give give back to Nature who is always giving to us!

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III. Buying Clean Foods

The life and consciousness that we ingest becomes the life and consciousness that we manifest. In other words, you are what you eat. Food is on the first shelf of every traditional healer's medicine cabinet. The animals and plants that we eat have unique and specific characteristics that can help or hurt certain ailments [1]. These characteristics include their macro-nutrient make-up (i.e. carbohydrate, protein, and fat), their vitamin and mineral content, their energy signatures such as yin and yang, and the consciousness embedded in their tissues based on the life they've lived (e.g. the comparison between animals who have suffered in a confined animal feeding operation (CAFO) versus animals pastured and raised in a humane and loving environment). One category of the above food characteristics influences the other categories. For instance, meat from animals raised in CAFOs and vegetables raised in monocultures or sprayed with pesticides have far fewer vitamins and minerals than humanely and organically raised meats and veggies. Plus, non-organic meats and vegetables can contain toxic chemicals, added hormones, and antibiotics. If we consume stressed-out, low-consciousness foods, how do you think our bodies will reflect this in our tissues? They sure won't be contributing to healing, at least not nearly as well as high-conscious, wholesomely-raised foods.

When we buy and prepare our foods to maximize their healing potential we must keep in mind three simple rules:

1. Buy organic, local, fair-trade, pastured, grass-fed, sustainably harvested, and humanely-raised animal foods and produce whenever possible.

Plants and animals grown and raised in a wholesome, natural way are more nutritious, more delicious, safer, and better for our environment. Here are a few things to keep in mind when buying foods with an ecological awareness:

- Where did the food come from and how much climate-changing fossil fuels was required to bring it to your home?
- Who grew/raised your food and have they gotten fairly compensated for their efforts, or are they being oppressed by systemic racism, sexism, classism, or corporatism?
- Was the food raised with environmentally benign or beneficial practices? Does it contain GMOs? Is it organic or sustainably-farmed? What are the waste management and soil fertility practices of the producers?
- Were chemicals sprayed on the plants we eat, and if so what kinds? Were growth hormones or antibiotics given to the animals that provide us with milk or meat, and if so what kind?
- Concerning the animal products that we consume, what were those animals fed and how were they raised and treated? How is this compatible with their natural instincts and emotional/physical needs?

- Animal products containing antibiotics (any dairy or meat that is not organic) must be completely avoided by CFers because they are causing rampant antibiotic resistance, something we have to be very careful to avoid so that when we need antibiotics to treat our lung infections, they work as effectively as possible. The CDC and the WHO have both condemned the use of antibiotics in livestock for this reason [2].

If it is not possible for you to buy organic all the time, here are some suggestions:

- Avoid conventional CAFO-raised meat completely. It is dangerous in that it is more at risk for contamination with pathogens; has added artificial hormones, antibiotics, chemicals, and fillers; and is very inflammatory due to its high omega-6 and low omega-3 fatty acid content. The same goes for non-organic (non-pastured) poultry, eggs, and dairy, too. That's not mentioning all of the important ethical and environmental concerns with CAFOs. If you have to have an animal protein that's not organic/sustainable/humane, I would suggest getting some seafood instead. Plant-derived protein may be best for everyday use if you can't get good animal protein, and then supplement with high-quality, high-consciousness meat as often as possible. Also, find a farmer who sells grass-fed, humanely raised meat and buy a huge of meat at once at whole-sale prices. If your freezer is big enough, invest in a half-cow or pig, or split a share with a friend. You can get *really* cheap, high-quality meat this way.
- Shop according to the [Dirty Dozen/Clean Fifteen List](#). This list is based on which fruits and vegetables have the most residual pesticides on them when you pick them up at the grocery store. Eat your veggies no matter what, but choose organic strategically to avoid the produce that has the highest occurrence of toxic chemicals.
 - [Dirty Dozen](#) (buy these organic to avoid the toxic pesticide residues on conventional varieties): apples, celery, cherry tomatoes, cucumbers, grapes, hot peppers, imported nectarines, peaches, potatoes, spinach, strawberries, sweet bell peppers, PLUS kale/collard greens/chard, summer squash (zucchini and yellow squash; watch out, some conventional zucchini might be GMO).
 - [Clean Fifteen](#) (these are ok to buy conventional because they have lower rates of pesticide toxicity): asparagus, avocado, cantaloupe, sweet corn (watch out, some of it might be GMO), eggplant, grapefruit, kiwi, mangoes, mushrooms, onions, papaya (watch out, almost all Hawai'ian papaya is GMO), pineapples, frozen sweet peas, sweet potatoes.
- [A note on affordability of local, organic foods](#): Yes, they might be more expensive than conventional foods, but in reality conventional food prices are actually artificially low due to federal subsidies and super-sized factory-farmed monoculture. Local, organic foods are priced according to reality. In the past *all* of our food was local and organic. Only since the post-WWII "Green Revolution" have we been spraying enormous fields of fruits and veggies with toxic chemicals and confining animals in inhumane and unsanitary feedlots for the sake of "efficiency". What has efficiency given us? Disease and environmental devastation. Conventional agriculture is a very new way to grow food, and it is unnatural and unsafe. We've

been eating organic foods for millions of years, yet we have only had about 60 years to see whether or not this new way of producing food is viable. And look at the results: diabetes, obesity, cancer, heart disease, soil degradation, habitat destruction, nutrient pollution in our waterways... the list goes on and on. Buying organic and humane foods is important for so many reasons, so look in your budget to see where you can trim down spending on unnecessary things in order to spend more on food. Get rid of your TV! Reduce your utility bills by using less energy and water. Bike and walk instead of driving. Get rid of expensive addictions (coffee, cigarettes, alcohol, etc.). Eat out less, cook at home more. Shop at thrift stores. Most of these things that save you money actually reduce your ecological footprint, too! Yay for sustainability and a bigger food budget! Of course, you can always grow your own organic food! Even a window box of herbs or a bucket of cherry tomatoes is a good start.

2. Buy whole foods.

This means buy fresh produce, fresh animal products, and whole grains/nuts/seeds instead of processed and packaged foods. Avoid buying packaged foods as much as possible, and instead buy from the bulk bins. If you must buy packaged foods, a good rule of thumb to follow is that there can only be 10 ingredients or less, and there cannot be anything on that list that you can't pronounce or don't know what it is. Eating whole foods also means eating the whole forms of foods, i.e. whole milk, full-fat cheese, whole meats (not reduced fat meats), and full-fat ingredients. Foods that have had something removed from them are by definition highly processed and denatured, therefore bad for you. That goes for everyone, even people who don't need the fat as much as we do. Reduced-fat products are often destroyed by heat and pressure, have added toxic chemicals used in the processing, or have added sugar to replace the fat. If you eat packaged foods, be sure to avoid any foods that are labeled with "reduced"-something, or that make any health claims. Michael Pollan said in his book *In Defense of Food*, that you can be fairly sure that a food is unhealthy if the package is claiming that it is healthy for you. It's all about marketing, and we can't fall into any of those traps. Be especially wary of anything labeled "heart healthy" or anything stamped by the American Heart Association - these are clear signs of an unhealthy food (as explained in detail in *Nourishing Traditions* by Sally Fallon). If a food is wholesome and un-messed with, there is no need to advertise its health benefits. I always stick to the rule (which is applicable to life in general) that if something has to be advertised, that means that you don't need it and it's probably bad for you anyway.

Since we'll be eating mostly whole, unprocessed foods, that means the majority of our foods will be cooked at home from scratch. This may take a bit more time and effort, but our health will greatly benefit from it. Be strategic about how you spend your time cooking and prepping meals. Maybe you could cook all your meals on your days off for the rest of the week and then freeze or refrigerate them. Maybe you could make a huge pot of soup on Sunday that could make up your lunches for the rest of the week. Maybe you always have a ball jar full of sprouting brown rice on the counter to keep an uninterrupted supply. Eating out at restaurants is not only expensive, but it is unpredictable (because you don't know what ingredients they have put in the food), and way too tempting to eat something you're

not supposed to that will make you feel sick later.

3. Check your labels

Many companies use words on their labels that seem like they might mean indicate that they are good for animals and the environment: "cage-free", "natural", "vegetarian-fed", "free-range", etc. Let's examine what these words really mean:

- "Cage-free" - when referring to eggs, this simply means that the hens are not kept in cages. While this is better than battery-raised hens, it says nothing about the conditions the hens are actually raised in. If this is the only qualifier on a carton of eggs, it means that the hens are still being raised in inhumane, cramped, unnatural, and stressful conditions, usually in a henhouse with thousands of other birds who never see the sun, are fed unnatural food, and are very likely to be diseased. Instead, look for "pasture-raised" or "pastured" eggs, which means the hens live mostly outdoors and eat natural food (grass, leaves, bugs, some grain).
- "Natural" is a completely unregulated word and means absolutely nothing on a food label. Have you ever wondered why a packaged food-like-substance containing high-fructose corn syrup and food colorings can be called "all-natural"? This is why. So you can ignore the word natural on food labels.
- "Vegetarian-fed" - similar to "cage-free", all this means is that an animal wasn't fed its neighbors that died from ill-treatment nor animal byproducts. If you can believe it, some CAFO-raised herbivores (dairy and meat cows, and poultry too) are actually fed meat from their neighbors that died, or from industrial animal wastes. Is that sick or what? It's stupidity on a grand scale. So vegetarian-fed may simply mean their handlers are using common sense. So it essentially means nothing.
- "Free-range" - This is another misleading label which can mean different things depending on the type of animal raised. In egg-farming this term has no legal meaning, so you can ignore it. In poultry meat farming, it simply means the birds have some access to the outdoors, but there is no standard for how large and area or for how long. Industrial poultry operations can technically call their meat free-range and all they have to do is cut a hole in the side of their monster henhouse so there is access to a tiny yard of a few square feet for thousands of birds. Furthermore, broiler chickens (those bred for their breast meat) are so mutated that most of them can't stand or walk long distances due to the enormous weight of their breasts. So we cannot rely on this word to guarantee us humane treatment of poultry. In the raising of other animals (e.g. beef, pork, lamb) there is no legal definition of the word, so it is essentially meaningless. Instead, look for the word "pasture-raised" or "grass-fed".
- Manufacturers also come up with clever words that sound like they could indicate humane treatment but actually mean nothing at all. For example, one time I bought a package of "range-grown" turkey jerky, but I didn't know what "range-grown" meant so I called the company to ask. They said it means that the turkeys are kept in a giant barn with thousands of other turkeys and do not get access to the outdoors. Does that seem humane to you? I was obviously very frustrated that their fancy wording had tricked me into believing I had bought humanely raised turkey. There are many labels that clever advertising firms use to trick us good-hearted folks into

buying inhumane animal products, so read your labels carefully and know what those words mean.

- **Good labels** to look for are "grass-fed", "pasture-raised" or "pastured", "certified humane", and "organic". Grass-fed means an animal (usually a grazing animal like a cow) lives outside and eats only grass and forage, their natural diet. These animals are not fed grain (which is not part of their natural diet and very hard for grazers to digest) nor are they given antibiotics or hormones. There are several options for certification of grass-fed meat and dairy, so either look for a certification on the label or get to know the farmer better. Pasture-raised or pastured means that the animal has plenty of outdoor space to roam around in and engage in all the behaviors and sensations that the animal would in its natural habitat. There is no certification for this qualifier however, so you're going to have to find a brand or farmer that you trust in order to verify that this is indeed true. Another good label to look for is "Certified Humane" which requires animals be given continual access to the outdoors, they are not given hormones or antibiotics, and they are slaughtered humanely. This certification is done by a third party verifier. "Organic" is also a good label because it has a strict, legally-binding definition, however the organic certification does not have specific requirements as to the amount of space available to animals to roam or be outside, and animals can also be fed grain, as long as it's organic. To get the best quality animal products, buy meat or eggs that have the most number of these good labels. Or better yet, know your farmer personally ask them how they raise their animals, and go to the farm to visit them! For more info on what specific labels on animal foods mean, check out this [guide](#) from Animal Welfare Approved.

Sources:

[1] *Healing with Whole Foods*. Paul Pitchford.

[2] <http://www.cdc.gov/drugresistance/threat-report-2013/index.html>

IV. Guidance for Elimination Diets

Every person has individual nutritional needs based on the characteristics of their body and their disease. But given that most CFers have several commonalities in pathophysiology, there are certainly some foods that are commonly bad for us and commonly good for us. Similarly, the info in this section on "What to Eat" and its subsections (on carbs, fats, and proteins) will be helpful to pretty much everyone who wants to improve their diet and their health, not just to folks with CF. This info will be especially helpful for folks suffering from digestive, neurological/psychological, inflammatory, and autoimmune diseases.

There are so many harmful and unbeneficial foods in the Standard American Diet, the standard CF diet, and even a more mainstream "health-conscious" American diet, that it's hard to know where to begin. We kind of have to start from the beginning, because unfortunately it is standard protocol in the CF world to tell patients to eat those things that are bad for everyone else, as if the rules of human nutrition don't apply to us. Well, as it turns out, we're humans too, and in fact what is bad for everyone else may be *doubly bad* for us!

Yes, CFers need more calories, and yes, we need more fat, but this entirely depends on the source, the quality, and our ability to absorb them! We cannot eat calories and fat indiscriminately - there are many sources of these things that are toxic and can exacerbate our disease! So let's become more informed about what *kinds* of calories and what *kinds* of fats we ingest and what they do specifically to our bodies (down to the cellular level).

First, I will outline what CFers and others wanting to heal must eliminate from our diets and what we must add in to our diets in order to improve our health and reduce the unnecessary stress that we place on our digestive and immune systems. Second, I will go into greater depth regarding different aspects of the "do's" and "don'ts" of a healing, anti-inflammatory, Paleo-esque diet. An important thing to keep in mind is that because everyone's body is unique, some people will need to eliminate grains and dairy completely, while others can eat them in moderation, and still others need to cut them out for a period of several months to let the body heal before reintroducing these foods slowly. You need to experiment to see what feels good to you. The information in these sections on nutrition are based on the understanding that a personalized Paleolithic-type diet is the most healing diet for all humans - a kind of least-common denominator diet, if you will - and that for a certain period of time some of us may need to use an even more strict elimination diet (like the Gut and Psychology Syndrome Diet) in addition to rebalance our gut flora and heal our gut, then transition to a personalized Paleo diet. This is what I have done and it has benefitted me greatly.

Toxins++ - <i>any food containing preservatives, food additives and</i>	Whole Foods - <i>all vegetables, humane and organic animal products, low-sugar fruits,</i>
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<i>food colorings, MSG, artificial flavors, refined flour, caffeine, cigarettes, alcohol, other recreational drugs, certain pharmaceuticals and OTC drugs, junk foods, candy, soda, soy products, peanut products, artificial sweeteners</i>	<i>certain nuts and seeds, wild plants and herbs, gluten-free whole grains (depending on tolerance)</i>
Concentrated sweeteners - sugar <i>(including refined table sugar, brown sugar, evaporated cane juice, beet sugar, etc.), molasses, high fructose corn syrup, corn syrup, agave syrup, yacon, fruit juice</i>	Natural sweeteners (in moderation) - raw <i>local honey; dried fruit, fresh fruit, or fruit juice in certain situations; stevia; maple syrup (if tolerated)</i>
Unnatural "Nutritional Supplements"++ - <i>any food-like substance that is labeled as a nutritional supplement yet is unrecognizable as real food. These include Carnation shakes, ScandiShakes, Ensure, any conventional weight-gain powders, drinks or bars, pre-packaged protein shakes, Power Bars or protein bars with highly-processed and unnatural ingredients. Essentially, anything that is pre-packaged and has any ingredient that you cannot recognize as food or cannot pronounce</i>	Natural Nutritional Supplements - <i>homemade high-calorie shakes and smoothies, whole-food fruit and nut bars, raw hemp protein powder, spirulina, alfalfa powder, organic whey protein (if dairy is tolerated)</i>
Bad Fats - "vegetable oil", <i>refined oils of any kind, all plant-derived refined polyunsaturated oils (soy, canola, rapeseed, sunflower, peanut, sesame, almond, avocado, etc.), hydrogenated oils, trans-fats, margarine, super-market olive oils</i>	Good Fats - ghee/clarified butter <i>(if dairy is tolerated), unrefined coconut oil, saturated animal fats such as lard or bacon fat; oils not for cooking: cold-pressed flax seed oil, fish oils, REAL unrefined extra virgin cold-pressed olive oil</i>
Milk and Denatured Dairy^^ - <i>all animal milks (except breast milk during infancy, which is SO important), all <u>pasteurized</u> dairy and its products including yogurt, cheese, keifer, etc., even if it's organic; milk solids, powdered milk, whey, or any dairy-derived additives put in food</i>	Traditional Dairy and nut milks - raw, <i>unpasteurized and fermented organic dairy in the form of long-fermented yogurt (SCD style) and hard cheeses like cheddar. Dairy is only allowed if there is no lactose or casein sensitivity. Instead of animal milk we can use any <u>unsweetened</u> nut milk including coconut milk, almond, sunflower seed, hemp milk, hazelnut milk, etc. Homemade nut milks are best and cheaper</i>
Gluten** - wheat <i>(including durham,</i>	Non-glutenous grains** - rice, quinoa,

<i>semolina, spelt, einkorn, and kamut), barley, rye, seitan/wheat gluten, wheat germ</i>	<i>millet, amaranth, buckwheat, gluten-free (non-contaminated) oats. All must be whole grain, sprouted, and/or properly prepared using the traditional methods outlined in Nourishing Traditions by Sally Fallon.</i>
Grains and Legumes** - <i>all of them including non-glutenous grains; lentils, beans, soy, peanuts, etc.</i>	Safe starches** - <i>cooked carrots, radishes, winter squashes (acorn, butternut). Replace grain flours with nut/seed flours like coconut flour, almond flour, buckwheat flour</i>

++ Toxic foods in the first category cause inflammation and lead to problems like cancer and a variety of disease we just don't need. Fake foods labeled as nutritional supplements are toxic as well because they contain denatured substances that are inflammatory and exacerbate digestive problems, plus they are usually very high in sugar and rancid oils. In addition, all of those vitamins and minerals they add to these "supplements" are of the lowest quality and usually synthetic, so they have extremely low absorption rates, if they are absorbed at all. Remember, a food corporation's number one priority is profit, not the health of the people it sells its products to, so it will minimize the costs of making its products by choosing the cheapest, lowest-quality ingredients. If you need to boost your levels of vitamins and minerals, get them from whole foods and high quality, bioavailable supplements, which I discuss in more detail in the section [Supplements and Herbs](#).

^^ Some people can tolerate dairy (organic, grass-fed), but it is a very common allergen/irritant. There should be a period of at least a few weeks where it is eliminated and then added back in slowly to assess one's sensitivity.

** While some people have varying levels of tolerance of grains and legumes, depending on the state of their digestion, it is recommended for everyone to gut out gluten, especially wheat gluten. For the most sensitive people, all grains and legumes need to be eliminated, as well as many high-fiber or starchy vegetables, according to the GAPS diet.

A proper elimination diet will eliminate all of the foods in the left hand column for a little while, in order to assess one's digestive sensitivities. Some foods from the left hand column can be added back in after a period of time, depending on the person's tolerance and level of gut healing. But there are some foods in that column that will never be added back into the diet: toxins, most concentrated sweeteners, unnatural "nutritional supplements", bad fats, and gluten. These foods have little to no nutritional value and can be very detrimental to one's health. There are many types of elimination diets, but the one I have used before is the GAPS/SCD.

The Gut and Psychology Syndrome Diet (GAPS) diet was developed by a doctor in the UK to treat the digestive causes of psychological diseases such as autism, schizophrenia, depression, and dyspraxia. The Specific Carbohydrate Diet (SCD) is an older version of this diet that was developed in the 1920's to treat Celiac disease. Both the GAPS and SCD diets eliminate many types of carbohydrates and irritating foods in the effort to starve out whatever pathogenic gut infection may be at the root of these digestive and psychological diseases. It is an effective protocol in many situations, but I believe even these diets must be personalized to the individual's needs, and often times using herbs in conjunction can speed up recovery time. For more information on these diet theories, please check out the links in the [Resources](#) section.

V. Carbohydrates

Now that we've gone over what foods to eliminate and what to replace them with, let's go into more detail about the foods on both of those lists, broken into their macronutrient categories: carbohydrates, fats, and proteins.

I have divided the category of carbohydrates further into three sub-categories:

A) Sugars

B) Grains and starches

C) Fruits

While eating a low-carb diet is very beneficial for most healthy humans and especially for those with many kinds of inflammatory diseases, I don't necessarily think being on a low-carb diet is the way to go for CFers, since it's harder to keep weight on without carbs. I do, however, think that we must be very picky about the *types* of carbs we eat for two main reasons: 1) remediating carbohydrate malabsorption, dysbiosis, and grain protein allergies, 2) preventing hyperglycemia. It is completely possible to get enough calories and eat a good amount of carbs without eating grains or refined carbohydrates. It is true that eating too many carbs, even carbs from fruit and whole grains, can cause hyperglycemia and exacerbate our disease, so we must eat them in moderation and with great attention paid to our blood sugar and digestive symptoms. There are even certain techniques that we can use to make starchy vegetables like potatoes a lower-glycemic food. I will discuss these techniques in this section. I strongly believe that catching glucose intolerance early and treating it through dietary control and cinnamon or insulin supplementation can prevent or reduce lung exacerbations and systemic inflammation. If you've developed glucose intolerance, experience reactive hypoglycemia, or suspect your glucose tolerance is deteriorating, I would think about getting a glucometer and regularly testing your blood sugar, then go from there depending on what you find.

Our pre-industrial (and especially pre-agricultural) ancestors thrived on relatively low carb diets. All of the carbs that our ancestors ate were complex, contained lots of fiber, resistant starch, and phytonutrients. Wild honey was the only concentrated source of sugar for many hunter-gatherer groups, and was only available seasonally in limited amounts. The recent explosion in chronic disease in the Westernized world is due largely to a radical increase in the amount of carbohydrates (especially refined carbs) eaten on a daily basis. A very large part of disease in the US could be cured by restricting carb intake and going back to the low-carb diets of our ancestors. Even though CF is not caused by eating too many carbs, it can certainly be exacerbated by it, so it is important for CFers (and anyone else struggling with a health issue) to be very mindful of the quantity and quality of carbs they're eating. Let's look at that now.

A) Sugars

Eliminating concentrated sweeteners and high-glycemic index foods is one of the most important step in creating a healing diet (for CF and everyone else). By sugars I mean any concentrated sweetener including cane sugar (in *all* its forms), high-fructose corn syrup, beet sugar, agave syrup, maple syrup, artificial sweeteners, and brown rice syrup. Some of these are more harmful than others, so as we wean ourselves off of our sugar addictions (most Americans have a sugar addiction, I did even though I ate "healthfully" by conventional standards) some sweeteners may act as bridge-substances to help us make the transition to a "sugar-free" diet. I chose to use honey (raw and local only), and you can see I put it on the "replace it with" list on the previous page because it is the least harmful of all of the sweeteners, except for stevia. However, honey still has a high glycemic index and will still spike our blood sugars if eaten alone or in excess, so it must only be eaten with other foods and in very small quantities. Eliminating sweeteners has helped me recognize and enjoy the natural sweetness of many whole foods. At one point I was a slave to my sugar addiction and it made me feel really bad about myself. Now, my cravings for sweets are long gone, and it feels incredibly liberating! Be aware that sugars are not just in foods, they're in drinks too. Sugary drinks are where a lot of Americans get most of their sugar (and calories in general). Even fruit juice is high in sugar and relatively low in nutrition, plus it's pasteurized and often contains many additives. I do not recommend drinking juice at all, except for low-sugar home-made vegetable juices (in moderation). Check your labels and drink only unsweetened and low-sugar beverages. Water with lemon is the best choice. Also, avoid artificially sweetened drinks as those are toxic for other reasons.

But why is **honey** (in moderation) okay? It's my only sweetener and here is why. Raw, local, unfiltered, organic honey is actually medicinal when used in small quantities. It contains antimicrobial compounds that bees use to prevent infection in the hive, including hydrogen peroxide, bee defense-1, and propolis. In fact, if you're making kombucha you can't use raw honey because the antibacterial properties of it will kill the scoby. Wow, powerful stuff! Researchers have actually conducted studies on honey's antibacterial effects, including against MRSA and Pseudomonas [1]! It is increasingly used in medical applications to hasten wound healing, especially for things like bed sores, burns, and skin infections from drug-resistant pathogens. In addition, honey is almost a 50/50 balance of glucose and fructose with a tiny bit of maltose in there, and almost no sucrose. As I discussed in CF201, some people with severe digestive problems have issues with the enzymes that break down disaccharide sugars (e.g. lack enough sucrase to break down sucrose) so it is very important to use a sweetener that is already broken down into monosaccharides, glucose and fructose. It's important to have the glucose fraction equal to or greater than fructose in a food in order to optimize fructose absorption. I will discuss fructose malabsorption more in the fruit section below. Furthermore, raw honey is the only sweetener that is essentially unprocessed - you scoop it out of the hive and eat it, that's it. Good honey has gone through no heating or filtering process, so it is a whole food that the bees have created for themselves (and kindly share with you). Honey is still pretty much pure sugar (monosaccharides) however, so we must watch our blood sugars accordingly. You can check out the sugar breakdown of sweeteners and other foods [here](#). Maple syrup is

pretty much 100% sucrose and agave syrup is mostly fructose, so for those with sensitive digestion, both of those can cause digestive upset.

In my eBook *Understanding CF*, I touched on carbohydrate malabsorption and blood sugar irregularities in CF and how these can lead to many other problems, including pulmonary exacerbations. But there are many other problems with eating refined sugars and concentrated sweeteners including tooth decay and bone malformation, bone demineralization and osteoporosis, systemic inflammation, and [heart disease](#). Of concern in the greater Western population is development of type 2 diabetes. Type 2 diabetes is epidemic in the US due to excessive carbohydrate consumption, and a [recent study](#) estimates that almost half of the American population is diabetic or pre-diabetic.

Sugars feed infection

The first and most important point that I need to make in this section is that pathogens such as bacteria and yeasts thrive on sugar. These pathogens are very simple organisms and need simple energy sources. The simplest energy source is monosaccharides. As I discussed in my *Understanding CF* eBook, ingesting certain carbohydrates that you cannot fully digest and absorb can travel into the lower intestines where they feed pathogenic bacterial growth. This can cause a bunch of digestive issues, and if continued long enough will develop into leaky gut syndrome (a.k.a. compromised intestinal permeability). Leaky gut causes chronic systemic inflammation and can trigger autoimmune disorders, food allergies/sensitivities, neurological disorders, and many other syndromes. Since most CFers are battling chronic inflammation due to bacterial infections in the lungs and sinuses, we need to make sure that we take extra precautions to eliminate the risk of gut infection as well. The solution is to become very conscious of the quantity and quality of carbohydrates we consume, cutting out unnecessary and potentially harmful sugars, and replacing them with beneficial nutrients.

Secondly, eating a lot of carbohydrates and sugars raises our blood sugar, feeding the organs throughout our body with extra sugar and ensuring that pathogens are well-fed, wherever they may be. This means that having sugary blood can cause our other bodily fluids to have a higher sugar content. I have mentioned before but I will mention it again, because it is such an incredibly important point, that CF lung fluid is more sugary than normal, and even more sugary in folks with CFRD. In a 2007 study, people with CF had significantly higher levels of glucose in their lung fluids (i.e. mucus) than normal people, and patients with CFRD and hyperglycemia had even more glucose in this fluid than non-diabetic CFers [2]. Having extra sugar in the lung fluid could mean that that sugar is fueling bacterial proliferation in the lungs. Not only that, but the inflammation caused by the hyperglycemia causes the junctions between our epithelial cells to weaken, allowing further infiltration of glucose into lung fluid [2]. Since all CFers with pancreatic issues have irregular insulin secretion to a varying degree (that gets worse with age), our ability to keep our blood sugars low and under control is compromised [3,4].

Thirdly, having chronic inflammation, infection, and stress causes insulin resistance. This means that if you're battling a particularly bad infection, when you eat sugar your cells will not respond to insulin normally and will not absorb as much glucose from your blood,

leaving your blood extra sugary and causing hyperglycemia [5]. I've written more on hyperglycemia and glucose intolerance on this [Blog post](#). So if we've got impaired insulin secretion, chronic bacterial infection, plus insulin resistance from an acute episode of that infection, we want to stay the hell away from sugars!

Refined sugars cause vitamin and mineral imbalances

One issue is that carbohydrates require the presence of B vitamins in order to be digested, however if we eat refined sugars and carbohydrates in the form of white sugar or white flour which have been stripped of all vitamins and minerals in their processing, in order to digest these things we must draw on our body's stores of B vitamins [6]. This is a problem because most Americans are deficient in B vitamins to begin with, as the Standard American Diet (SAD) is so lacking in adequate nutrition, vitamins and minerals. Furthermore, sugar consumption causes bone loss and tooth decay because it disrupts the ratio of phosphorus to calcium in the blood. Because sugar is acidic, the presence of excess sugar in the blood requires calcium (which is alkaline) to be drawn into the blood vessels from the bones to counterbalance its acidity, de-mineralizing the bones and leading to osteoporosis and low bone density [6]. As you know, adult CFers are at higher risk for osteoporosis than our peers because of our malabsorption problems, so adding sugar to the equation is simply asking for trouble. Furthermore, the drop in phosphorus levels in the blood relative to calcium reduces calcium's absorption into our cells, making it unusable and setting us up for other issues, such as heart disease. Heart disease is a sugar disease in a number of ways, and this is just one more; calcium deposits in the arteries of the heart cause heart attacks [7]. Not that CFers are particularly high risk for heart disease, but you undoubtedly know someone who is, so share this info! Eating whole foods that contain sugars, such as fruits and grains, does not contribute to the problem of demineralization because these foods also contain dietary cofactors (other vitamins, minerals, fiber, fats, proteins) that regulate sugar metabolism. But when sugars are refined and stripped of these nutrients, as with white sugar and corn syrup, there are no beneficial cofactors to help you regulate your blood sugar, and you can get hyperglycemia and all of its nasty consequences.

Sugars are inflammatory and damage your cells

The structure of a monosaccharide (single-sugar molecule) is such that when it travels through your blood vessels it acts as an oxidant (the opposite of an antioxidant) just like free radicals, breaking down the electron fields of the atoms in your cells, and damaging cell walls. Sugars can actually cling to cells like leaches, and you can examine the rate of the clinging with a blood test called a hemoglobin A1c, which is given regularly to diabetics. If you have a chronically high blood sugar, your HA1c is going to become higher. When sugar has clung to a cell the body attempts to tear it away with an immune response. In the blood vessels, after the body tears the sugar away it patches the hole in your cell with cholesterol. Again, heart disease is a sugar disease: a high blood cholesterol count has nothing to do with how much cholesterol you consume in animal foods, but has everything to do with the rate at which sugar is damaging your arteries [6].

Besides contributing to heart disease, sugar has a similar deleterious effect on all of our cells. What I am particularly concerned about are the cells in our stressed-out digestive

tracts, and the cells of our distal bronchial arteries and the lung cells connected to them. If our digestive tract is already inflamed and unhappy from poor nutrition and malabsorption, the presence of sugar to further inflame our gut cells is not going to help the situation. I have been struggling most recently with hemoptysis (coughing up blood) and I believe this issue is exacerbated by high blood sugar. As an oxidant, sugar weakens the fragile cellular linings of the smallest of the arteries in the lungs, called the distal bronchial arterial capillaries, which exchange oxygen to our lung tissue. It may be that the problem of hemoptysis can be caused from both sides: one is from the lung side through bronchiectasis (dilation and scarification of the airways) and breakage of the airway, and the other is from the artery side through degradation and inflammation of the artery wall from sugar oxidation. So then when the artery breaks into the airway, you get a lung bleed. Having chronic high blood sugar also damages certain organ systems with a lot of capillaries, such as the eyes and kidneys; that's why diabetics are routinely tested for eye and kidney disease. Severe diabetes (usually type 2) also can result in nerve damage and limb amputation because the nerves and capillaries in the outer extremities are destroyed by sugar, causing tissue death. We're not really at risk for that (unless we eat lots of carbs and have untreated diabetes), but it is one example of how powerfully destructive sugar really is.

Sources:

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B) Grains and Starches

Most people have no trouble digesting complex carbohydrates in the forms of starchy or fibrous vegetables, fruits, or whole-grains. But for those of us with CF, digestive issues, diabetes, or dysbiosis, complex carbohydrate digestion can be problematic. Certain compounds in complex carbohydrates can be irritating and can cause unwanted bacterial fermentation that may lead to digestive upset, as well as contribute to a wide range of other symptoms including neurological/psychological dysfunction, allergies, autoimmunity, systemic inflammation, increased susceptibility to infections, and increased respiratory mucus production. For those of use with dysbiosis or compromised digestion, being more conscious of our carbohydrate consumption is a very important step towards healing our gut.

A Change in Diet Theory

Until recently, I believed that in order to correct dysbiosis, restricting carbohydrates for an extended period of time was a required part of the protocol in all situations. I believed that it was necessary for all people with dysbiosis to use an elimination diet that restricted carbs like GAPS or SCD. But the more research I did, the more I realized that this one-size-fits-all approach is not appropriate for long term use and needs to be used with adjunct therapies in order to be effective. The GAPS, SCD, and FODMAPs diets all restrict certain types of complex carbohydrates contained in fibrous plant material such as those in grains, fruits, and vegetables in order to address dysbiosis and its associated symptoms. The goal of the GAPS and SCD is to severely restrict carbohydrate consumption over a period of weeks or months so that the pathogenic bacteria in the gut are starved out and their populations decimated. These diets then follow up with a period of replacing those bad bacteria with good bacteria in the form of probiotic supplements and/or fermented foods, and slowly reintroduce plant fibers over a period of weeks or months. The FODMAPs diet does not aim to starve out pathogenic bacteria, but simply tries to remove the fermentable substrates that pathogenic bacteria use to proliferate and cause digestive symptoms. However, all of these 3 diets have the same unintended consequence: they starve out good bacteria populations along with the pathogenic populations, reducing overall intestinal microbiota diversity. As we've discussed before, beneficial gut bacteria depend on plant fiber to ferment upon and produce immune-stimulating compounds and short-chain fatty acids that directly feed our intestinal cells. A healthy population of good bacteria also provides competitive defenses against infection by pathogenic species. Thus, these diets should not be used for more than a few weeks without the use of complementary therapies to kill pathogenic flora, such as antimicrobial herbs or specific antibiotics, such as rifaximin. Recent research and clinical experience has shown that the GAPS/SCD/FODMAPs diet approaches are not effective in correcting dysbiosis by themselves, though they may be used in the short-term to manage digestive symptoms [1]. In fact, it may be even more effective to maintain an adequate level of complex carbohydrates in the diet during the "killing" phase of a gut-healing protocol because bacteria are most effectively targeted by antimicrobial herbs and drugs when they are proliferating [2]. Bacteria and other pathogens that are stressed via starvation or other means have the ability to go dormant

(similar to hibernation) in order to preserve their reproductive capacities for less stressful times. Many herbs and antibiotics target bacteria's reproductive processes, so if these bacteria stop reproducing and go dormant, the antimicrobials may be ineffective at clearing the infection. Recent clinical experience seems to indicate that feeding the pathogenic flora with carbs and FODMAPs (if tolerable for the individual) while at the same time hitting them hard with antimicrobial herbs is the most effective treatment plan with the lowest recurrence rate.

All cases of dysbiosis are different, but for many types of dysbiosis the most effective way to combat it is with a multi-week (at least 2-3 week) course of antimicrobial herbs (herbs are shown to be as or more effective than the leading antibiotics used for dysbiosis) alongside a whole-food Paleo-like diet that maximizes plants and minimizes inflammatory foods. After that is a period of using gut-healing herbs (like marshmallow, meadowsweet, calendula, comfrey) and foods (bone broth, l-glutamine, gelatin, good fats and proteins) that will help restore proper gut permeability and heal the leaky gut. During this stage it is absolutely critical to correct whatever imbalance there may be in digestive secretions (such as low stomach acid) that may have contributed to the development of the dysbiosis in the first place. At the same time probiotics (supplements and foods) and prebiotic fibers (in vegetables and herbs like burdock root, flax seeds, dandelion root, marshmallow root, etc.) are added back into the diet slowly, helping to re-establish a healthy gut ecology. The Paleo-like diet is maintained as long as possible, and can allow for foods to be slowly added back into the diet according to the person's tolerance (but those inflammatory foods like sugar, wheat, junk food, and inflammatory oils will always be avoided).

Starchy, Fibrous Vegetables, and FODMAPs

As I mentioned, reducing fibers, starches and FODMAPs in the diet is only useful if trying to manage digestive symptoms in the short term, but will not correct the root cause of the issue, which is dysbiosis. Nonetheless, it is worth mentioning here some resources for learning more about these carbohydrate-restrictive diets. On the GAPS ([Gut and Psychology Syndrome](#)) diet or SCD ([Specific Carbohydrate Diet](#)) certain fruits and vegetables (as well as most sweeteners and other carbohydrates) are restricted based upon their starch and fiber content in order to minimize bacterial fermentation. During the initial phases of these diets, some starchy vegetables such as root vegetables (potatoes, sweet potatoes, parsnips, arrowroot, etc.) are on the "no" list, as well as many fruits and fruit juices. "Legal" starches include carrots, pumpkins, winter squashes, and beets. For a full list of the foods that are "legal" or "illegal" on the gut-healing regime according to the SCD, [click here](#). The FODMAPs diet (which stands for Fermentable Oligo-, Di-, Mono-saccharides, and Polyols) eliminates many commonly used fruits, vegetables, and grains from the diet based upon their complex carbohydrate content. The rules are a bit more complicated than the GAPS/SCD, so if you are interested in learning more [read this](#) for a more detailed explanation. Here is a helpful [chart](#) of foods allowed and not allowed on the FODMAPs diet.

Once the dysbiosis has been addressed and complex carbs/FODMAPs are no longer causing any issues, consider preparing starchy vegetables like potatoes in a way that increases their prebiotic content. In Jo Robinson's book *Eating on the Wild Side*, she explains that by refrigerating or freezing potatoes for at least 24 hours after they've been cooked, you can

reduce their glycemic load by returning the starches that have been converted to simple sugars with cooking back into resistant starch, which is a kind of prebiotic fiber. This can help mitigate any blood sugar spikes that potatoes may be want to cause, and also increases their capacity to feed your friendly gut bugs! A cheap and easy way to increase the amount of prebiotic resistant starch in the diet is to add raw potato starch to smoothies, shakes, and other creamy-cold foods. To read more about this, click [here](#).

Issues with Grain

Besides containing complex carbohydrates (including FODMAPs) that can feed bacterial fermentation (good and bad), grains contain some compounds that can be irritating to our digestive systems if they are not properly prepared in the traditional ways used by our ancestors for thousands of years [3]. Humans haven't been eating grains all that long. From an evolutionary perspective, the Agricultural Revolution (which introduced the cultivation of grains about 10,000 years ago) was just last week. Depending on your genetic heritage and how long ago your ancestors started eating grains, you may tolerate grains better or worse than your friends or neighbors. Generally, those with ancestry from the early-adopting places like the Middle East, central Europe, and Asia have a better time digesting grains than those from most other late-adopting places such as the Americas, Africa, Melanesia, or even the British Isles (Northeastern Europe and the British Isles only adopted agriculture - and not uniformly - about 6,000 years ago) [4]. Even on the early-adopting continents, certain areas only had exposure to certain grains. For example, South America cultivated corn (maize) and the British Isles cultivated oats, but in these places exposure to wheat came much later (thus, their exposure to glutenous grains was minimal until then). Our ancestor's epigenetic exposure to grains and gluten generations ago may be a determining factor in the ability for us to digest them now. I am of Irish ancestry, and it turns out that wheat was not commonly used in Ireland until the 18th century [5]. From an evolutionary stand point, I highly doubt that this is enough time for my ancestors' guts to have developed a strong ability to digest the gluten in wheat. This may be why gluten intolerance is quite common among groups with Celtic ancestry. What's also interesting is that the CF gene is linked with Western and Northern European ancestry, and Western and Northern Europe had later exposures to grains and gluten. Keeping all this archeological/paleo-genetic information in mind might actually be helpful for determining which grains you may tolerate best, and there are many resources on the [Weston A. Price website](#) that provide information on specific traditional diets from all over the world and how they properly prepared their grains.

Grains are the seeds of grasses bred over many generations of human domestication to be larger and fatter than wild varieties, and to emphasize their sweetness and starchiness. But grains are very smart. They have a number of different mechanisms that they utilize to ensure that they maintain their viability in tough weather out in the field, and also to protect themselves against animal predation. With these mechanisms, a grain is hoping that even if you do eat it, its defenses will cause it to pass through you completely undigested, so that you will poop it out whole on the other side and it will still be able to seed itself in the ground and propagate another generation of grasses. Without proper preparation and cooking, these natural grain defenses are left intact and we are unable to fully digest and assimilate the grain. This is why all traditional societies that ate grains had

very specific and complex ways of processing grains to remove the grain's defenses to ensure maximum digestibility. These methods of preparation all included a number of stages including soaking, germinating, sometimes sprouting, and controlled fermentation.

One of the biggest problems with grains is that they all contain phytic acid, to varying degrees depending on the species. Phytic acid occurs in the bran of a grain, and is the principal form of phosphorus storage in many plant tissues. When ingested, the arms of phytic acid molecule bind to minerals inside the body, chelating them and carrying them out in the stool. Therefore, not only is the phosphorus in an unprepared grain completely unavailable to animals with only one stomach (i.e. humans), but also ingestion of phytic acid inhibits our bodies' abilities to assimilate many essential minerals from our foods such as calcium, magnesium, iron, and zinc. Furthermore, phytic acid is also an enzyme-inhibitor, preventing our digestive enzymes (i.e. pepsin, amylase, and trypsin) from helping us break down our foods and allowing us to absorb them [6]. Another problematic part of a grain is lectin, which is also contained in the bran of whole grains. One purpose of lectins in grains is to act as a browsing deterrent to insects and so it can be sharp and shard-like, and in the guts if sensitive people can cause significant inflammation. Because of these and other irritating compounds in grains, some people are choosing to remove grains from their diets entirely and return to a more "paleolithic" (pre-agricultural style) diet of meat, animal fats, fruits and vegetables, tubers, and wild or wild-like plants. This is where the idea of the Paleo Diet comes in. It makes sense really, since many of us have a lifetime's-worth of digestive trauma from eating improperly prepared grains that we must recover from, so eliminating grains completely for an extended period can be very healing. After so many years of exposure to phytic acid, lectins, and highly-processed grain products, our guts need some time to heal and recover. Some people choose to stay off grains completely forever, some choose to reintroduce them gradually once they've learned how to properly prepare them using the methods outlined in *Nourishing Traditions*. Essentially all of the issues with grains (phytic acid, lectins, fermentable carbohydrates, etc.) are also true for legumes, so many people who cut out grains choose to gut out legumes as well. Legumes include beans, peas, soy, and peanuts.

The Gluten Problem

Gluten is a protein that is the most common culprit implicated in grain sensitivities. Only some grains contain gluten, such as wheat (including spelt, einkorn, kamut, farro, and durum), barley, rye, and contaminated oats. Gluten-free grains include uncontaminated oats, millet, quinoa, buckwheat, corn, rice, sorghum, and teff. Gluten can become a problem when it is not properly broken down by traditional cooking methods (as described in *Nourishing Traditions*) and/or when the individual has inadequate digestive capabilities or dysbiosis/leaky gut syndrome. What often happens is that an individual develops a sensitivity to the gluten in wheat for one of the above reasons, and this sensitivity can lead the immune system to develop a cross-reactivity to the gluten contained in other grains. A significant amount of research and writing has been dedicated to the topic of gluten sensitivities and allergies, so if you want to learn more about this issue in detail I suggest you check out the works of [Chris Kresser](#), [Dr. Alessio Fasano](#), or Dr. William Davis' book [Wheat Belly](#). If gluten causes a sensitivity that is left unaddressed and if there is also an underlying dysbiosis that causes increased gut permeability (i.e. leaky gut syndrome),

then the immune system may begin to create antibodies against gluten so that every time you eat gluten, an allergic or autoimmune reaction results which can lead to severe digestive distress, systemic inflammation, or autoimmune tissue damage in other parts of the body.

The development of all autoimmune diseases (such as Celiac disease, Type 1 diabetes, and multiple sclerosis) is dependent upon certain precursors, not the least of which is increased intestinal permeability. We know that gliadin (a part of gluten) in wheat and other grain proteins called prolamins can cause the release of a human protein called zonulin, which is responsible for controlling intestinal permeability. When grain proteins binds to the zonulin receptor, zonulin is released, causing the junctions between the cells in the intestinal wall to loosen, allowing food and bacteria to pass through into the blood [7]. Furthermore, certain grain proteins are similar enough in structure to the proteins that make up certain tissues in the body that when the immune system attacks the "invading" grain protein that was mistakenly allowed into the blood, it also attacks whatever may look like that protein, even if it is your own cells! This is autoimmunity: when the body attacks itself in a misguided immune response. One example of this is type 1 diabetes (T1D), where "two independent studies tracking large cohorts of newborns at high risk for T1D showed that the odds ratio for developing the disease was 4- to 5-fold higher in subjects prematurely exposed (<3 months of age) to gluten" [8]. In other words, for some type 1 diabetics, the gluten in wheat has caused the body to develop auto-antibodies which trigger immune attacks against the islet cells in the pancreas, essentially destroying its ability to produce insulin. There are about 50 disease that are thought to be caused by autoimmunity, and all of them have some relation to abnormal intestinal permeability. Once a leaky gut is established, an auto-antibody can be created from a grain, legume, or dairy protein to attack a variety of human tissues causing joint pain, organ degeneration, degradation of the nerves, and other diseases [9]. In fact, one of the leading researchers in autoimmunity, Dr. Alessio Fasano, believes that leaky gut and dysbiosis are required as preconditions for the development of autoimmunity [10]. This is why Paleo and anti-inflammatory diets remove all grains, legumes, and dairy to eliminate the possible causes of any autoimmune disorders, even if they may yet be subclinical.

How to Properly Prepare Grains

I highly suggest you pick up a copy of *Nourishing Traditions* if you would like to keep grains in your diet because it is an absolute necessity that grains be properly soaked, germinated, and fermented to maximize their digestibility. Because whole grains still have the bran, they contain the most phytic acid and must be soaked and germinated for a number of days in order to remove it. Grains with the bran removed, such as white rice, have less phytic acid but they've been "killed" in processing so they cannot germinate. Whole grains are literally alive, and will sprout if you give them the right conditions. Sprouting grains not only breaks down their phytic acid, but also potentiates naturally-occurring enzymes (including phytase, which breaks down phytic acid) and many minerals that would not be bioavailable otherwise. Different grains need different soaking times and preparation methods, and [this article](#) gives some very detailed information on some of these grain-specific preparation methods. For some people, it might be too much of a hassle to properly prepare their grains, in which case it will be necessary to go Paleo.

I used to eat brown rice that I sprouted before cooking. I soaked the rice overnight for 12 hours, then drained it and let it sit to germinate (rinsing every 12 hours) for several days. When the grains start to show little white sprouts popping out I know they are ready to be cooked. I then put them into a pot or rice cooker and slow-cook them with a ratio of 1 cup rice to 2.5 cups water. After it has cooked, sometimes I would let the cooked rice sit on the stove overnight to let it ferment a little, which allows bacteria to break down some of the complex carbohydrates for me, making my job a little easier. You can do this until it tastes sour, if you'd like. Then it becomes probiotic! My sister loves to make soured millet.

Glycemic Load

It is worth noting that grains have a significantly higher glycemic load than other whole food carbohydrates. I can no longer eat whole grains (not even my favorite, brown rice) anymore because it always spikes my blood sugar outrageously high no matter what I do. Potatoes, sweet potatoes, other starchy vegetables, and fruits do not have the same effect and are much easier to control my blood sugar with. Interestingly, processed whole grains (like brown rice pasta or rice cakes) are easier to control my blood sugar with. I don't know the cause of this phenomena, but others with CF-related diabetes have reported the same thing happens to them too. So whole grains should be used with extreme caution with people with glucose intolerance or diabetes. Mainstream dietary advice may even tell diabetics to eat whole grains as part of a "balanced diet", but this is bad advice. Diabetics should avoid grains completely if they cause wild swings in blood sugar, and should cautiously choose vegetable or fruit starches (like potatoes or squashes) instead. Some dietary advice for diabetics will tell you to avoid potatoes because their glycemic load is so high, but this is only true for white and yellow potatoes (like Russets). I have not found potatoes to be as problematic for me as grains.

How to Begin

The first step in embarking on a carbohydrate conscious diet is to eliminate all glutenous grains, especially modern wheat. These are the hardest grains to digest, and even people with "normal" digestive systems are developing sensitivities to them. At the very least, cutting out modern wheat (any wheat that is not spelt, einkorn, or kamut, which are the ancient varieties) is an absolute must. Modern wheat is so hybridized, genetically altered, and sprayed with chemicals that it is a very common allergen in the West (especially America). Because we've been so traumatized by the gluten in modern wheat, a lot of folks also develop sensitivities to the gluten in other grains, which the body detects as being very similar. So eliminating all gluten is the safest choice.

An important thing to note is that after you've been on an elimination diet or a cleaner diet (like Paelo) for some time you may notice that you've become much more sensitive to how foods make you feel, and you will even notice that foods you thought you could tolerate just fine before are now giving you digestive troubles. This may be disappointing, but it's actually a great sign that you've eliminated enough of the background irritation and inflammation in the gut that you can actually *feel* when things are going wrong - because it will be *unusual* for you to feel uncomfortable!

Using an elimination diet or a Paleo-like diet during and after addressing any potential dysbiosis is a very useful tool for discovering what you are or are not sensitive to. *But be careful.* In most cases it is a good idea to make big dietary changes when you are relatively healthy (i.e. not battling an acute infection or too underweight), and make sure that you are not just eliminating the "bad" foods but also replacing those them with "good" foods. This may seem obvious, but I actually did not think this through when I started the GAPS diet a few years ago. Carbohydrates are the main macronutrient that allows us to gain and maintain weight, so to cut them out without replacing them with alternatives can cause weight loss. This may be a good thing for those who are overweight but it is a bad thing for most CFers. I didn't give myself enough options for high calorie meals, and so I ended up just cutting out foods and so I ate a lot less and lost weight. *Don't do this!* Plan it out and think it through. Before making the big switch, practice making the meals and recipes that you will use on your new diet, to make sure it's easy enough to incorporate into your new routine. Meal planning is key when first starting out on a new diet. Add in new good foods *before* eliminating bad foods so that you always have a lot of choice when it comes to healthy meal options.

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B) Fruits

Fruits are made up primarily of carbohydrates (simple sugars, complex carbs, and fiber), and each fruit has a different sugar and carb profile. The simple sugars in fruits are primarily sucrose, glucose, and fructose. The healthiest fruits are those that are low in simple sugars, higher in fiber, and high in phytonutrients. Fruits need to be selected appropriately depending on the state of one's internal ecosystem. The sugars and fibers in fruits may exacerbate certain states of dysbiosis, thus the low FODMAP ends up cutting out many fruits from the diet. As I discussed in the section on [Grains and Starches](#), cutting out irritating fermentable carbohydrates may alleviate symptoms in the short term, but it will not solve the underlying problem, which is dysbiosis. The ultimate goal is to rebalance the intestinal flora so that one can eat a wide variety of fruits without having uncomfortable digestive symptoms. Many fruits are important sources of essential nutrients as well as fibers that help maintain bowel health and feed beneficial flora in the colon.

But not all fruits are equally as healthy for us. As discussed in Jo Robinson's fantastic book *Eating on the Wild Side*, humans have been breeding fruits for thousands of years to be bigger, lower in fiber, and higher in sugar. Therefore, those fruits that have been the least "messed with" are often the healthiest for us, such as wild blueberries, blackberries, raspberries, and certain varieties of apples. Those fruits with the least nutrition and the most sugar are bananas, mangoes, and papaya, among others. I highly suggest reading Jo Robinson's book for tips on how to choose the healthiest varieties of fruits and how to store and prepare them to optimize their antioxidant potential.

The higher the sugar content and the lower the fiber content, the higher a fruit's glycemic load will be and the more it will spike the blood sugar. For CFers with glucose intolerance or CFRD, this is a very important thing to keep in mind. Often mainstream medical advice will tell patients that fruits are always ok to eat, but people with blood sugar issues need to be careful. Yes, a banana is a lot better than a soda or a candy bar, but a banana will still spike the blood sugar also. I have certainly caused hyperglycemia by eating too much fruit, and I have also caused my A1c to climb by binging on dried fruit for several months (prunes and apricots). Dried fruit has a higher concentration of sugars and so is particularly prone to causing hyperglycemia. Low glycemic fruits include tomatoes, berries, avocados, and apples that are more tart and less sweet. Since becoming diabetic I don't eat fruit that often, unless it's local and seasonal. I love wild blackberries, raspberries, and thimbleberries that grow near my house, and the wild apples around here are quite tart - just the way I like them! I will once in a while also indulge in a pears or plums, especially if they are local. I get most of my plant phytonutrients from colorful vegetables that have low glycemic loads.

Also, choose organic or wild-harvested fruits when possible to reduce your exposure to harmful pesticides and chemicals. Also, if you eat fruits that are grown in places not local to your area, it is important to make sure they were fairly traded, ensuring that the farmworkers were not exploited. For example, it is extremely important to buy fairly-traded bananas. Buying local fruit is important in order to get the freshest in-season fruits that are

highest in phytonutrients, and to reduce the greenhouse gas emissions associated with shipping produce from far-off lands. Also, if you cannot afford to buy organic fruit all the time, look for non-GMO varieties or fruits on the [Clean 15](#) list.

Fructose Malabsorption

As I mentioned, depending on the state of one's gut, certain fruits may be more or less irritating, depending on the types of sugars they contain. A common problem in people with SIBO or general dysbiosis is a reduced ability to absorb the fructose contained in most fruits, which feeds bacterial fermentation and exacerbates symptoms. Even in a normal person's digestive system, only about 25-50 grams of fructose per sitting is actually absorbed through the small intestine, and the rest gets punted to the colon. This is not a problem if there is no pathogenic overgrowth present, but for those with dysbiosis this can cause serious issues. Certain individuals with digestive issues have an even further reduced capacity to absorb fructose, meaning less than 25 g of fructose can be absorbed [1]. If you get the toots >24 hrs after eating a lot of fruit, or you feel a yeast infection coming on after regularly eating fruits (or other foods high in fructose, like agave syrup), you've got a problem with fructose absorption. I used to have this problem, but after a few years of concerted effort balancing my microbiome, I no longer feel any negative symptoms if I eat any type of fruit, in moderation. Fruit juice can also exacerbate digestive problems and contribute to yeast infections and bacterial fermentation. Furthermore, fructose is an osmotic agent, meaning that in large quantities its presence draws water into the colon, which can cause diarrhea.

Other than treating the dysbiosis directly with antimicrobial herbs and a gut-healing diet, it can be effective in the short term to eat fruits low in all sugars, or that have a balance of glucose and fructose. The presence of glucose in a food actually facilitates better absorption of fructose, so foods that have an equal or greater glucose to fructose ratio are safest to consume. These include most berries (blackberry, blueberry, raspberries, cranberries, strawberries, etc.), pomegranates, and very ripe bananas. You can check out the break down of sugars in a variety of fruits [here](#). Folks with irritable bowel syndrome frequently suffer from fructose malabsorption, so I've discovered a paper that outlines a specific dietary treatment for this issue, if you'd like to take a look [\[2\]](#).

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VI. Fats

Oh my gosh, I am so pumped for this section! Fats get me all excited. They are truly a powerful source of energy storage, and have twice the amount of calories per gram than carbs or proteins (that means twice the amount of energy!). Fat is an incredibly misunderstood substance in our society. There is a TON of misinformation and bad science out there about fats, and unfortunately the post-WWII myths about saturated fat as the cause of heart disease are still running rampant. The truth is that rancid polyunsaturated vegetable oils contribute to heart disease and the saturated fats in butter, lard, and coconut oil are *good* for your heart, not the other way around. Chris Kresser has done a whole series on this topic, so I would suggest you take a look at his [articles](#) for a more in-depth analysis of the science behind saturated fat/cholesterol/heart disease controversy. He is a very thorough researcher, and a very smart dude. This topic is also discussed in *Nourishing Traditions*.

Fats are a large part of pretty much every traditional diet. In fact, during certain seasons the traditional Alaskan Inuit got about 80% of their calories from seafood fat! With proper digestion, fat can be the most powerful source of energy nature has to offer us, and the highest quality fats (i.e. wild or grass-fed animal fats) contain high levels of bioavailable fat-soluble nutrients such as pre-formed vitamin A (retinol), vitamin D3, and absorbable essential fatty acids AA, DHA, and EPA. The fats that were traditionally sought after were animal fats (all of them saturated), and the fatty tissues of animals were much preferred over meats and protein-rich tissues. Animal fats have been considered a health food for millennia, but only recently since the advent of "food science" have animal fats been demonized as the cause of heart disease and obesity. The reality is that high-quality fats are absolutely critical to optimum health, and for those of us with fat malabsorption issues, we must choose our fats very wisely in order to maximize their benefit to us.

I will outline here the basic do's and don'ts of fats for CFers, and what I've discovered in terms of their impacts on my health. But first, a brief lesson on the chemistry of fats. If you have further interest in reading about the details of fat digestion, I suggest you read Dr. Mary Enig's article [Digestion and Absorption of Food Fats](#).

What are fats?

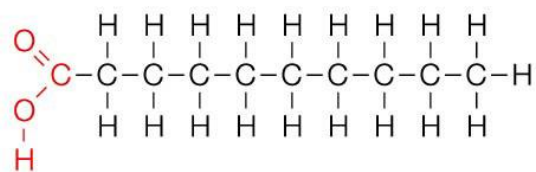
Dietary fats are really mixtures of different types of fatty acids. There are three general types of fatty acids: saturated, monounsaturated, and polyunsaturated. All natural fats in our diet are made up of all three of these types of fats in different proportions, but for expediency's sake we often label a fat under one of the three categories depending on which is most prevalent. Fatty acids are made up of hydrocarbon molecules linked together in long chains by their carbon atoms in either single bonds or double bonds. Single bonds are more stable links between hydrocarbons, and fatty acid chains with only single bonds are called saturated fats. Double bonds are less stable and prone to oxidation, which can

cause a fatty acid chain to break apart, causing rancidity and a toxic effect in the body. A fatty acid chain with one double bond is called a monounsaturated fat. A fatty acid chain with more than one double bond is called a polyunsaturated fat. Saturated fats are more environmentally stable, keep better at higher temperatures, and are less prone to rancidity. The more double bonds in a fat, the more likely it is to oxidize and become rancid. Oxidized, or rancid, oils release free radical electrons into the body, which can damage cells, create carcinogenic compounds, trigger inflammation, and reduce immunity. The regular consumption of rancid oils is linked to cancer, arteriosclerosis, heart disease, and digestive disease.

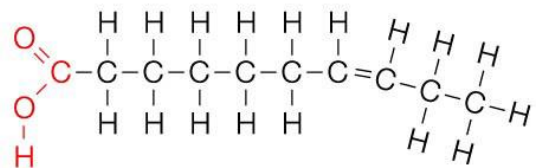
Oils that have rancidified by exposure to heat, light, or air are broken up into unnatural pieces so that the body cannot digest them properly and cannot store them in the right places for energy use. Undigested oils pass through you, and as they do they can pull fat-soluble vitamins from your guts, depleting your stores of A, D, E, and K. Foods containing rancid oils used to give me a significant amount on GI trouble. Even now, eating too many deep-fried french fries will give me loose stools and intestinal pain for days (therefore I rarely eat them anymore). It's not just cooking oils that can rancidify though. The polyunsaturated oils in nuts and seeds can rancidify easily, and often do when improperly cooked (roasted) or left out exposed to heat, light, and air. I used to have a similar nasty reaction from eating rancid nuts snatched from the bulk bins at the coop. Be very careful with any nuts or seed that you eat. Make sure they've been stored without exposure to heat, light, and air - this may rule out buying them from the bulk section at your coop. It is best to buy them with the shell on and to shell them yourself. If this is too time consuming however, instead you may want to seek out a source of high-quality raw nuts or seeds sealed in air-tight containers, then process them yourself. Remember that nuts and seeds also contain high levels of phytic acid, an enzyme inhibitor, making them very hard to digest if not properly processed in the traditional way. For more info on properly preparing nuts and seeds, click [here](#). In theory, nut butters can have the same problems, but because they're usually stored in air-tight containers, they may be safer. Many people with issues absorbing fats can have issues digesting nut butters, so be sure to eat them in moderation, according to what your guts can handle. Try to choose a nut butter whose only ingredient is the nut/seed. If oil is added to it, there is a risk that the oil has gone rancid, since it's most likely a polyunsaturated oil that is added (e.g. sunflower oil).

Hydrogenated fats are another type of fat, but they are completely unnatural and man-made. These are polyunsaturated vegetable oils whose double bonds have been artificially

Saturated



Unsaturated



changed to mimic more stable single bonds through an industrial process. This is what makes up margarine, and margarine use is strongly linked to heart disease. Hydrogenation makes a polyunsaturated fat, which is usually liquid at room temp, able to remain solid at room temp. This is highly desirable for corporations, because it increases the shelf-life of a product, allowing them to make more profit. Partially-hydrogenated fats are also called trans fats, which are similarly toxic to the body. Both hydrogenated and partially-hydrogenated fats are highly toxic because there are no enzymes found in nature that know how to break down such an unnatural substance (i.e. your enzyme pills don't work on them). The body, not knowing what to do with these kinds of fats, stores them in the adipose tissue but cannot retrieve them to make energy out of them, so they lead to a build up of body fat. They may also lead to a rise in serum triglycerides, which is a risk factor for cardiovascular disease.

Why do we need fats?

Fats insulate our bodies, protect the vital organs, hold them in place, and are vehicles for assimilation of fat-soluble vitamins, primarily A, D, E, and K (the ones CFers are commonly deficient in; that's why we take ADEK supplements). Furthermore, fats are the body's preferred method of energy storage. The body can easily convert stored fats into glucose for supplying the cells with energy. That's why it's important to have an adequate supply of excess body fat, in case we're sick or don't eat enough, so we've got a back up supply to fuel our bodies for a little while. Fats support the yin principle in the body, which is grounding and soothing, builds the tissues, enhances fluid metabolism, and directs nutrients into the organs [1], all things CFers need extra help with. Certain fats, such as omega-3 essential fatty acids, are highly anti-inflammatory and can help us reduce oxidative stress in the body.

Essential Fatty Acids

There are some fats that the body needs for a variety of processes, but that it cannot synthesize itself. These are called essential fatty acids, and must be obtained from the diet. Essential fatty acids (EFAs) are long-chain polyunsaturated fats. The EFAs that we are most concerned about, and that you may have heard of before, are called omega-3 and omega-6 fatty acids. There are three most basic EFA precursors, and these are linoleic acid or LA (an omega-6), arachidonic acid or AA (an omega-6), and alpha-linolenic acid or ALA (an omega-3). In a healthy body, enzyme conversions make other important EFAs from LA and ALA. Gamma-linolenic acid or GLA (an omega-6) is made from LA, while eicosapentaenoic acid (EPA) and docohexaenoic acid (DHA) are both omega-3's derived from ALA.

In general, omega-6's are inflammatory, and omega-3's are anti-inflammatory, so we should aim to have our omega-6 to omega-3 ratio as low as possible, ideally between 1:1 and 3:1. The modern American diet, which is highly inflammatory, can have an omega-6 to omega-3 ratio of about 10:1! Yikes! Furthermore, the presence of omega-6's like LA can inhibit the conversion of the omega-3 ALA to DHA. While all EFAs are necessary in varying amounts, the EFAs we need to be most concerned about getting enough of are the animal-formed omega-3's, EPA and DHA.

Both EPA and DHA are anti-inflammatory. EPA is good for healing the circulatory system,

while DHA is critical in brain and mental development. ALA is the precursor to EPA and DHA, and is found in plants. Flaxseed oil is high in ALA, as are all chlorophyll-rich foods, including leafy greens and seaweeds. The ability to convert ALA into EPA and DHA is dependent on one's health, and even in healthy people the conversion rate is very low, about 5% for EPA and 0.5% for DHA [2]. CFers are unusually low in EFAs, especially the beneficial omega-3's EPA and DHA [3], so including omega-3-rich foods in the diet and supplementation are very important. Because CFers have a harder time than usual making the conversion of ALA to DHA and EPA, we need to take the already-converted forms of these. Animals fed on ALA-rich foods (i.e. wild and grass-fed animals) make the conversion of ALA to DHA/EPA for us and store it in their tissues. So we must consume animal products in order to get these important omega-3's. The best sources of these are fish (the oilier the better), raw grass-fed dairy, and grass-fed meats. I also recommend taking a high-DHA/EPA fish oil supplement, which I will discuss in the [Supplements and Herbs](#) section.

Including more EPA and DHA in our diet is really important, but we must also remember to reduce our ingestion of omega-6's as much as is practical. This means avoiding all polyunsaturated vegetable oils (except unheated olive oil) and being conscious of our ingestion of foods that have a high omega-6 to omega-3 ratio, such as nuts and seeds. In addition, *grain*-fed meat from animals raised in CAFOs or other unnatural environments have a higher ratio of omega-6 to omega-3, and so should be avoided. Grass-fed meats contain much more omega-3's, since they are feeding on chlorophyll-rich plants and converting that ALA into EPA and DHA for us. Arachidonic acid (AA) is particularly inflammatory in large quantities, but is essential in small quantity for our body's vital processes. An overabundance of AA can produce breast lumps and arthritis, can stimulate cell division, and derivatives of AA are responsible for blood clotting, pain, and fever. Aspirin, NSAIDs, and steroids actually work by blocking PGE2 formation, an AA derivative [1]. AA is found in low quality animal products, such as chicken, eggs, pasteurized dairy, and grain-fed meats.

Even though pre-formed GLA is an omega-6, it does have some important beneficial effects on the body. The body further converts EFAs into prostaglandins (PGs), which are hormone-like substances that support a variety of body functions. GLA converts to PGE1, and DHA/EPA convert to PGE3. Both PGE1 and PGE3 have similar beneficial properties, so I'll discuss their effects together. They help the immune system kill and inhibit the proliferation of cancer cells; treat inflammatory diseases such as eczema and arthritis, as well as auto-immune diseases; control blood pressure; regulate brain function and nerve impulses; act as human growth factors; regulate insulin production; regulate prostate problems, PMS, and breast lumps; speed up metabolism in those with obesity. Furthermore, having more PGE1 and PGE3 in your system inhibits the production of PGE2, an inflammatory agent described above [1]. Most Americans have an overabundance of PGE2 in their systems from ingestion of toxic foods (low-quality meats, rancid oils, refined grains, etc.), so we should make sure that we are focused on getting more GLA/DHA/EPA to wipe out that PGE2! You can get GLA from spirulina, and the seed oils of borage, black currant, and evening primrose. These can be taken as medicinal supplements in capsule or liquid form.

In summary, eat more animal sources of omega-3's (DHA and EPA in oily fish, raw grass-fed dairy, and grass-fed meats), take fish oil supplements, and reduce your intake of omega-6's in polyunsaturated vegetable oils and low-quality animal products.

Good Fats, Bad Fats

Now you've got a good grounding in what fats are and how specific characteristics of fats produce different effects, so let's put all this into perspective by discussing which dietary sources of fat are best and which should be avoided. By now you know that all polyunsaturated vegetable oils should be avoided like the Plague (except for those GLA oils you may be taking medicinally). These include sunflower, safflower, canola, sesame, corn, soy, cottonseed, walnut, and generic "vegetable" oil. But which oils *should* we eat?

We should be eating primarily saturated fats, but within that category there are some that may be more beneficial for CFers. In particular, CFers should consume a lot of unrefined, cold-pressed, organic coconut oil. Ghee (clarified butter) is generally a safe bet because all of the lactose, casein, and milk solids have been removed from the butter fat, and if it's grass-fed it can be a good source of vitamins A and D. Olive oil is great on salads and any unheated applications, but cannot be cooked with because it's high unsaturated fatty acid content (90%) gives it a burn point low and makes it relatively vulnerable to rancidity. Only saturated fats should be cooked or baked with (i.e. coconut oil, ghee, or lard) because they have higher burn points, depending on the particular kind of fat. Animal fats such as lard (pig fat), tallow/suet (beef or sheep fat), and duck or goose fat are all great for multiple uses. Of course, all of these should be from grass-fed, free-range/pastured, and humanely-raised animals to ensure they contain all the vitamins, minerals, and omega-3's that we want, and don't have the toxins, hormones, antibiotics, and omega-6's that we don't want.

Coconut Oil: Fat of the Gods

Okay, I kind of worship coconut oil. A little bit. But seriously, it is an incredible substance. It is made up of 92% saturated fat, 6% monounsaturated fat, and 2% polyunsaturated fat, so it is very environmentally stable. It is also made up of what are called medium-chain fatty acids. Most oils - whether from plants or animals, saturated or unsaturated - are made up of long-chain fatty acids. This just means that they have a large number of hydrocarbons in their fatty acid chains, and so these chains need to be broken up into many small pieces before the body can thoroughly assimilate and utilize them. So medium-chain fatty acids (MCFAs) have shorter chains that require less bile and fewer enzymes to them break down in order to be absorbed through the intestines. The enzymes in your saliva and the juices in the stomach are enough to break them down, so they can be absorbed right away when the MCFAs reach the intestines [10]. This is AWESOME for CF, because pancreatic enzymes and bile production aren't even necessary to digest coconut oil! MCFAs are absorbed through the intestinal wall and into the portal vein, which brings them to the liver where they are used directly as a fuel, acting more like carbohydrates than fats (and without the impact on blood sugar). Most fats are stored away in body tissue before being burned as energy, but MCFAs are burned up right away, making them an easily absorbable and powerful energy source for folks with poor digestion. This is why MCFAs are often found in medical foods for premature or sick infants, folks with intestinal diseases, or older people with damaged

digestive tracts. Furthermore, since MCFAs are so easily absorbable and provide the high calorie power of fats, that athletes are using them when they need quick bursts of energy and enhanced endurance [5]. They still, however, need to be emulsified before being absorbed, and for those with deficient bile production I suggest taking bitters with coconut oil and/or lecithin. One of my good CF friends has no gallbladder and could not take bitters for complicated reasons. The coconut oil would go right through her. But when she added lecithin to her food, she could finally absorb all fats, including coconut oil!

In addition, the MCFAs in coconut oil and human milk are high in lauric acid, which has anti-bacterial, anti-viral, and antioxidant properties [6], another important reason why CFers should eat more of it (and be breast-fed for as long as possible)! Coconut oil is medicinal in so many other ways, I couldn't possibly list them all, but I will add that it has anti-inflammatory and fever-reducing properties, reduces oxidative stress within the bone to prevent osteoporosis, and can even be used as a moisturizing lotion and sunscreen [7]! Can you see now why I'm a little bit obsessed? This stuff is incredible.

I recommend eating as much coconut oil as possible. Literally add it to everything you eat (being aware of the food combining rules). You can find it at your local coop or health food store, or order it in bulk online (better to order it in bulk from your coop to support local business). You can keep it in your pantry and doesn't need refrigeration. You can cook and bake with unrefined coconut oil at temperatures up to 350 degrees F, and refined coconut oil can withstand temperatures up to 450 degrees [8]. There are only drawbacks to coconut oil that I can think of: 1) its cultivation is not local to the US, so it's shipped from far away (usually southeast Asia), giving it a larger carbon footprint, and 2) it gets solid at room temp or below, so it can become a little tricky when trying to add it to cold foods (e.g. smoothies).

Lard, Tallow, Suet, Duck and Goose Fat

These are also great saturated fats that have anti-microbial properties and contain a good amount of omega-3's if they are from grass-fed or pastured animals. They are also important vehicles of the fat-soluble vitamins A, D, E, and K. These fats generally can be used for cooking at higher temperatures. The great thing about these is that you can capture them when cooking meats, which makes them even more economical. After frying your bacon, make sure to capture the leftover fat in the pan, and put it in a glass jar on the fridge for cooking with later. Animal fats also add a lot of flavor to foods. Experiment and see which fat your body loves best. Another great thing about animal fats is that you can get them from a local source pretty much *anywhere* on earth. You can keep it in your pantry and doesn't technically need to be refrigerated, but I do, just to be safe.

Ghee

Ghee is a medicinal fat often used in Indian cooking and applied in the ancient Indian medical system called Ayurveda. Ghee is clarified butter, meaning that the butter is boiled and the milk solids, casein, and lactose are removed, leaving behind only the butter fat. People who are lactose intolerant and/or allergic to milk can usually tolerate ghee, though I cannot. Ghee is 65% saturated fat, 5% monounsaturated fat, and 30% polyunsaturated fat. In Ayurveda, ghee is understood to strengthen the *ojas*, the essence that governs the tissues

and balances hormones. It also stimulates digestive fire and can heal gastrointestinal injuries and inflammation. Ghee contains butyric acid, which is a fatty acid with antiviral and anti-cancer properties, and it has also been found to prevent and treat Alzheimer's [1]. Ghee from grass-fed cows is high in fat-soluble vitamins. Its can be used in cooking and baking at temperatures up to 485 degrees F, so it is the best choice for high-temp baking and frying. I recommend using ghee if you absolutely can't live without butter. Ghee is made from cow butter, so like lard/tallow/etc. it can be sourced locally pretty much anywhere in the US, if you don't mind [making it yourself](#). You can also buy it pre-made in your local coop, Asian market, or health food store. You can keep it in the pantry and it does not need to be refrigerated.

Nuts and Nut Butters

Nuts, seeds, and their butters should be considered as fats for the purposes of proper food combining. Most nuts and seeds have at least two times more fat than protein, especially when made into "butter". Nut butters can be a great source of both fat and protein conveniently bundled up in one whole food. It's a great snack, quick and convenient, but can also be made added into many recipes and sauces. I eat some raw almond butter, and make my own nut butters out of mac nuts, sunflower seeds, and pumpkin seeds. I have been experimenting for years with peanut butter alternatives, and am seeking the ones that my body finds most digestible. Peanuts are not a very healthy food. In addition to be legumes (which puts them on the "no" list for the SCD and the Paleo diet), they are high in enzyme-inhibitors and the way they are improperly processed in modern society causes them to trigger allergic reactions in so many people. They are also high in inflammatory omega-6's. So it's a good idea to find an alternative. Sunflower seed and pumpkin seed butters are great because they rarely causes allergies (it's neither a tree nut nor a legume), they're lower in phytic acid than other nuts/seeds, they're relatively cheap to make, and they're really delicious! I prefer the taste of sunbutter even to almond butter. That's the truth. Plus, if you're really dedicated to being a localvore you can probably find a local source of organic sunflower seeds and make sunbutter yourself in a food processor. And you can soak or sprout them before processing them if they're raw. It'd be a heck of a lot cheaper too. If you buy sunbutter in the store, beware that there is no added oil, because that oil is most likely rancid.

I'm not a huge fan of nuts really, but I have discovered the incredible power and sweetness of macadamia nuts. They are incredibly high in fat and calories (1/4 cup has 237 calories and 25 grams of fat!), and they have an very sweet flavor. I add them to my smoothies. They are much lower in phytic acid than other nuts, so you don't have to worry about soaking or processing them - you can eat them raw without a problem. Plus they contain a good amount of potassium, phosphorus, magnesium, calcium, vitamin E, B vitamins, niacin, and folate [9]. Furthermore, if you eat them raw they'll have lipase in them, which will help you digest their fats. I get my mac nuts from Hawai'i. I suggest you order them online at [Hamakua Nut Company](#).

Again, avoid buying nuts/seeds and their butters in the bulk sections of health food stores and coops, even if they are cheaper. The polyunsaturated oils in nuts/seeds go rancid a heck of a lot quicker in bulk sections since they're exposed to a lot of air, light, and heat. It's

best to buy these foods in air-tight containers protected from light and heat. This might be the only time I tell you to choose a packaged food over a bulk food. I hate to encourage more packaging waste, but in this case it may save you from a nasty gut reaction.

How to Use Good Fats

There are just a few things to keep in mind when using the "good fats" I have described above. Here are a few tips:

Baking/Recipes

Saturated fats are safest to bake with and cook with at higher temperatures. All of the good fats mentioned above have high levels of saturated and monounsaturated fatty acids, so they are solid at room temp. When a recipe calls for an "oil", as in something that stays liquid at room temp, just replace it with one of the above good fats. Melt these in a sauce pan before adding it to a recipe that calls for a liquidy fat. Avoid microwaving fats. Cooking things the old-fashioned way with regular old heat is the safest and most natural way to prepare foods.

Don't Overdo it

Fats are difficult and energy-intensive to digest even for healthy people. This means that when we eat fats, we must eat them with other foods only in certain combinations, in moderation, and keeping their individual characteristics in mind. For coconut oil, this is not as important because it's so easily digestible that it'd be very hard to eat too much of it. But with other oils that digest slower and require more energy to break down and absorb, eating too much of them in one sitting can cause G.I. upset or can cause only partial digestion of fats. Undigested fats may go rancid in your guts, causing inflammation, and when they eventually pass through into the stool they will take your fat-soluble vitamins along with them. So making sure that we digest *all* of the fats we ingest is very important, because it's not always guaranteed. Of course, you will take your pancreatic enzyme pills and digestive bitters (I should have convinced you of their importance by now!). For some people with poor bile flow or who have had their gallbladder removed, taking lecithin with a high-fat meal can be very helpful in absorbing fats. Lecithin emulsifies fats (what bile does), which must be done before pancreatic enzymes (lipase) can break down fats further into fatty acids. Beet kvass, raw garlic, apple cider vinegar, and lemon water taken before a meal also stimulate bile secretion to some extent, but bitters have the strongest effect. If bile secretion is deficient, doctors sometimes put people on supplemental bile salts, but these may be less effective than lecithin. So instead, make your own smoothies/shakes and add lecithin, and see if you can absorb the fats better that way! The maximum amount of fat you can absorb in a sitting depends on the type of fat and on the person. So again, it's about experimentation and seeing what feels good to your body.

Cold-Pressed and Unrefined

If we are using an extracted oil like coconut oil or olive oil, we must make sure that it is extra-virgin, cold- or expeller-pressed, unrefined, and unfiltered. What does this all mean? Expeller-pressed means that the nut or olive is mechanically squeezed at below 160 degrees F, and may be filtered once to remove the residues (you can buy completely unfiltered coconut oil and olive oil though, which I would recommend because the more

plant-solids you have in the oil, the more nutrients will be present). Cold-pressed means that they were mechanically processed at below 100 degrees F, which ensures that the oil is not damaged during processing. Look for cold-pressed oils whenever possible. If you buy flaxseed oil, it *must* be cold-pressed, as it rancidifies very easily otherwise. Unrefined oils retain their vitamin E, which is an antioxidant and protects the oil from rancidity. Never eat oils that were extracted using chemical solvents (i.e. most polyunsaturated vegetable oils). Refined oils are stripped of their nutrients and flavor-giving properties, plus they may have traces of the refining chemicals left in them, so these should be avoided completely. Choose unrefined and unfiltered oils whenever possible because these oils still have in them their beneficial nutrients including lecithin, chlorophyll, vitamin E, beta-carotene or vitamin A, calcium, magnesium, iron, copper, and phosphorus [1].

Sources:

- [1] *Healing with Whole Foods*. Paul Pitchford.
- [2] <http://chriskresser.com/why-fish-stomps-flax-as-a-source-of-omega-3>
- [3] <http://www.cfmedicine.com/htmldocs/CFText/efa.htm>
- [4] <http://chriskresser.com/how-too-much-omega-6-and-not-enough-omega-3-is-making-us-sick>
- [5] <http://www.coconutresearchcenter.org/article10612.htm>
- [6] <http://chriskresser.com/beyond-paleo-3>
- [7] <http://www.greenmedinfo.com/blog/13-evidence-based-medicinal-properties-coconut-oil>
- [8] http://en.wikipedia.org/wiki/Smoke_point
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- [10] <http://chriskresser.com/rhr-could-copper-zinc-imbalance-be-making-you-sick>

VI. Protein

Ah, protein. The macronutrient that in modern American culture has become synonymous with "nutrition". Of course, there are a lot of other things we need in our diet besides protein, and we've discussed them in previous sections. Protein is important, but nothing to get obsessed over. Protein does not provide "power" or energy, despite what the protein bar industry wants you to think. Carbs and fats provide us with energy. Protein is for healing and building new tissues. This is a very important thing for CFers, because chronic inflammation and bacterial infection can damage tissue, requiring us to constantly repair and rebuild ourselves at the cellular level.

What are proteins?

Protein is the basic component for many different substances in the body, including hormones, cells, antibodies, and enzymes. Proteins are made up of smaller components called amino acids. Both plant and animal cells are made up of protein, so we can get adequate amounts of protein from both animal and vegetable sources, although there are marked differences in digestibility and nutrient bioavailability between them.

There are twenty commonly recognized amino acids, yet eight of these are *essential* amino acids that, like essential fatty acids, cannot be synthesized in the body and must be obtained through food. Most whole foods (plant and animal sources) have all eight of these EAAs. When eating a vegetarian source of protein, there is really no need to combine foods like rice with beans because a whole vegetable contains within it "complete" protein [1]. If a wider range of amino acids is desired within a vegetarian diet, it is fine to eat one type of vegetable protein (e.g. a grain) in one meal and another type of protein (e.g. nuts/seeds or legume) in another meal because our body stores a pool of these amino acids to be used as needed. Eating both a legume and a grain in one meal (e.g. rice and beans) is not necessary and is a poor food combination and very difficult to digest for those with compromised digestive capacity. Animal proteins do, however, have more of these twenty amino acids than vegetable sources, and this is why some think animal proteins are more "complete". In reality, you can get what you need in terms of amino acids from both plant and animal sources, but vitamin and mineral content is a whole different story.

Animal vs. Vegetable

All traditional diets since the beginning of human speciation have included some form of animal protein, whether meat, fish, milk, eggs, or insects. Most healthy people with good digestion need relatively little animal protein in their diets, just enough to provide them with the important vitamins and minerals that they can't get anywhere else (e.g. vitamin B12). But for folks with poor digestion and a significant disease burden, the need for easily digestible and nutrient-dense animal proteins is greater.

The amino acid and vitamin/mineral profiles of animal proteins more closely mimic the

amino acid and nutrient profiles of human tissues, since we are just animals after all. This means that if we are trying to repair our tissues, eating the tissues of another animal that closely resembles us, biologically, ensures optimal absorption of the nutrients we need to get the job done. In Chinese medicine there is a concept of "like heals like". If someone has a liver problem, a common prescription would be to eat the liver of an animal, or if there is a bone problem, to drink bone broth. From a purely reductionistic medical point of view, this makes complete sense because the amino acid and nutrient profile of the animal organ is likely very similar to the analogous human organ, and so the right nutrients are available in the right quantities to optimize healing and tissue growth in that organ. This is why every culture on earth has emphasized the use of *all* parts of the animal, from snout to tail. Each part has its medicinal value because humans are biosimilar to all other animals. Organ meats like liver, kidney, heart, and glands are generally higher in nutrients than muscle meats, so it's important to eat these regularly (or eat whole small animals, like anchovies). For those with a need for extra vitamin A and other fat-soluble vitamins, it is often recommended to eat liver at least once a week (usually beef or chicken liver). However, we must *only* eat organ meats from organic, free-range/pastured, grass-fed, and humanely raised animals because otherwise these organs could be filled with toxins and disease. Furthermore, different animal meats have different benefits on certain organs and conditions. In Five-Element Chinese Medicine, the lungs are benefited by eating fish, the spleen-pancreas (digestive complex) is benefited by eating beef, the liver is benefited by eating poultry, the kidney benefited by eating pig, and the heart benefited by eating sheep [1]. For CFers, eating fish is very important for the lungs and for many other reasons, and eating beef may be a good idea to benefit our digestive organs.

Omnivorous Digestion

Humans are omnivores, meaning that our digestive systems are designed to break down and absorb both plant and animal foods. This doesn't mean we can eat *all* foods, however. Our evolutionary history has designed us for efficient digestion of some foods, less efficient or less complete digestion of other foods, and almost no ability to digest others. In a state of good health, humans can digest and assimilate almost all animal foods well (besides dairy, where lactose intolerance is a limiting factor), given traditional knowledge and preparations. Plant foods are a little trickier. Most green vegetables are well-digested with a small bit of cooking to break down the fibers and carbohydrates (e.g. kale or dandelion greens), and some other green vegetables and fruits can be eaten raw without any problems (e.g. lettuce or cucumbers). There are other plant foods that cannot be digested at all without extensive cooking and these include grains, legumes, starchy vegetables (e.g. winter squash), and tubers (i.e. potatoes and other root veggies).

Being omnivores, our digestive tracts are kind of a hybrid of carnivorous and herbivorous digestive systems. Carnivores have comparatively short digestive tracts with larger, more acidic stomachs and less length in the intestines. Since meat proteins digest more quickly in the stomach there is less need for the absorptive capabilities of the intestines. Plus, a lengthy intestinal tract could cause stagnation and possible putrefaction of poorly digested meat. Herbivores have very long and complex digestive systems in order to convert plant nutrients and plant proteins into the animal proteins they need to comprise their tissues. No animal can break down plant material (cellulose) on its own, so we must harness the

digestive power of microorganisms to do it for us. The herbivorous digestive system is designed so elaborately specifically to harness the digestive power of these cellulose-fermenting microorganisms. The multiple stomach chambers and the extra-long colons of herbivores provide ample space for certain bacteria to live, and to ferment and break down the plant material into something easier to assimilate into the blood stream. Ruminants like cows, sheep, and goats do this fermentation in their multi-chambered stomachs, whereas horses and rabbits conduct fermentation in their very large colons [2]. Humans also conduct our plant-material fermentation primarily in the colon, but since it is a lot smaller we cannot extract as much nutrition from the raw plant material as a horse or rabbit could. Through cooking plants we've been able to expand our dietary options beyond what we digest only through colonic fermentation, and this is great. But again, we have to adhere to the ancient knowledge developed over millennia regarding the correct processes needed to adequately break down plant foods outside the body (through cooking and fermentation) for optimal assimilation inside the body. The new raw food movement is cool and makes sense for short-term cleansing of toxins accumulated over years of eating the Standard American Diet, but because we're not designed to digest raw plant foods completely, a raw (plant-only) food diet cannot be sustained for a very long time without the development of serious nutritional deficiencies and subsequent disease.

Nutrients in Animal Protein

Animal protein is high in bioavailable forms of protein, niacin, vitamin B6, vitamin B12, phosphorus, zinc, iron, riboflavin, pantothenic acid, selenium, and copper. The higher quality, humanely-raised, grass-fed animals have significantly higher vitamin and mineral levels, as well as a beneficial balance of omega-3's to omega-6's (i.e. grass-fed meat contains anti-inflammatory omega-3's while grain-fed/CAFO meat does not) [9]. This is because these animals are eating their natural diet (nutrient-dense grasses, shrubs, leaves, etc. grown in good soil) and not some CAFO concoction of GMO corn, agribusiness byproducts, hormones, and antibiotics. Animals raised in confined animal feeding operations (CAFO) or fed grain for the majority of their lives are significantly higher in inflammatory fats (omega-6's) and compounds, even if they are not fed growth hormones and antibiotics, which most conventional animals are. They are also very stressed and sickly, making their meat full of inflammatory compounds and toxins. Studies have shown that eating meat from animals raised in unnatural and stressful circumstances will raise a person's levels of C-reactive protein and IL-6, two markers of systemic inflammation. CAFO-raised poultry and eggs that are not "pastured" ("cage-free" and "free-range" are essentially meaningless terms) are also highly inflammatory [10]. Farmed fish are also to be avoided, as they are fed unnatural diets and exposed to toxic chemicals and pollution, in addition to the environmental destruction that fish farms cause.

Bioavailability of vitamins and minerals is really important to keep in mind, and this is why animal sources of vitamins and minerals are best - they are already in the forms that our body needs and can be quickly absorbed without wasting digestive energy. Sure, carrots are high in beta-carotene, a vitamin A precursor, but even healthy people have a low rate of beta-carotene to vitamin A conversion. It's been found that 47% of European women completely lack the enzyme needed to convert beta-carotene into vitamin A, and that children and diabetics also cannot make this conversion [3]. Oh, and guess what form of

"vitamin A" is in our CF-specific AquaDEK softgels: beta-carotene. Yeah, that's pretty much useless. So you can see why we can't rely on pharmaceuticals to provide us with adequate nutrition, we must get it from the original source: food. You may ask, why don't pharmaceutical companies use bioavailable forms of vitamin A, especially for sick people with bad digestion? The answer is that beta-carotene is cheaper and making all vitamin supplements with optimally-bioavailable ingredients would hurt corporate profit margins. So read the nutrient facts very thoroughly on your supplement bottles, and know which forms of what nutrients are most useful (I will discuss this more in the [Supplements and Natural Medicine](#) section). Maybe if enough of us put enough pressure on CF vitamin companies they'll start putting *real* vitamins in them. Maybe.

Bioavailability of nutrients in animal protein is highly dependent on how well we digest that protein. Protein digestion is done primarily in the stomach through the use of hydrochloric acid and the enzyme pepsin. When stomach acid is too low, protein is not properly broken down, pathogens are not destroyed, and we can get other G.I. complications such as acid reflux, gas, constipation, and bacterial overgrowth in the stomach and intestines. I discuss this more in-depth in [this blog post](#).

If animal flesh is fresh and from a healthy, grass-fed/pastured and humanely raised animal, it should be minimally cooked. Actually, high-quality animal flesh should be eaten raw whenever possible and safe, as there are many naturally-occurring vitamins and enzymes that are destroyed by heat. This is especially true for organ meats like liver, which are high in fat-soluble vitamins that are destroyed in cooking. Eating fresh, raw fish from a safe and trustworthy source is by far the healthiest animal protein you can consume. That's one reason why I'm such a huge fan of sushi. The essential fatty acid DHA, so abundant in seafood, is destroyed by heat. Grass-fed meats also have DHA, but in smaller amounts. Only raw animal protein has vitamin B6 [4]. Similarly, raw milk is high in vitamin C, but it is destroyed by heat in the pasteurization process. All traditional cultures eat some of their animal protein raw. When animal protein is cooked it becomes harder to digest because the molecules become denatured, and because the naturally occurring enzymes that would help you digest it are destroyed. If you are concerned about parasites or pathogens, freeze your meat for at least two weeks before thawing and consuming it raw. Freezing for long periods of time kills most pathogens. You can also make dishes that "cook" meats in an acidic substance, like lemon juice (e.g. ceviche). Another important thing to keep in mind when consuming raw meat is that in order to kill any potentially harmful pathogens contained in it, you must have adequate stomach acid. This is another reason to make sure you have adequate stomach acid levels and to supplement with Betaine HCL if you need it.

Protein and Vitamin/Mineral Imbalances

There is a limit to how much protein we can digest in one sitting and in a day. Eating too much protein can cause imbalances in the vitamins and minerals in our bodies. Vitamin A is needed to metabolize protein, and if we eat too much protein without adequate intake of fat-soluble vitamin A (in raw animal fats) we can deplete our body's vitamin A stores, leading to reduced immunity, autoimmune disorder, and kidney/eye problems [5].

Eating too much protein can also cause an imbalance of calcium in the body and can lead to

bone loss. Eating a lot of protein, more than about 75g per day, causes the body to excrete more calcium in the urine than is absorbed from your food [1]. However, studies have shown that supplementing with calcium while on a high protein diet can actually improve bone mass. When the body begins to excrete calcium in the urine after a high-protein meal it triggers a cascade of reactions in a variety of organ systems that enhances calcium absorption. If not enough calcium is taken in through the diet, the body starts to reabsorb the calcium in the bones, leading to bone loss. The solution to this is to eat more calcium in the diet along with proteins so that we can take advantage of the body's natural inclination to upregulate calcium absorption [6]. We can also take calcium pills, but this is an inferior source to food. Traditional diets had all of this figured out. Bone broths and/or raw dairy were an important part of most traditional diets, and there was heavy emphasis on eating the *whole* animal, including the bones. Calcium is in its most absorbable form in raw dairy and in animal bones or shells. Modern nutritionists love to tout dairy as the best source of calcium, and while there is certainly calcium present in it, if the dairy is pasteurized very little of that calcium gets absorbed into the bones [7]. Pasteurization reduces the bioavailability of calcium in dairy so that instead of getting absorbed into the bones to build bone mass, it can get deposited in the soft tissues and in the blood, where it can cause a number of serious problems including arthritis and heart disease [3].

The conclusion to this section is to eat protein in moderation (not more than about 75g per day or 35% of daily calories [11]) and to eat it in the presence of calcium, ideally from animal food sources.

Plant Proteins

While plant proteins are harder to digest, they certainly have value and should be included in the diet. All chlorophyll-rich vegetables have protein in them, so eat your leafy greens! While I consider nuts and seeds to be fats for the purposes of food combining, they are also a good source of protein. Due to the risks of rancidity, their high phytic acid content, their ability to cause allergies or sensitivities, and their higher omega-6 content, nuts and seeds should be eaten in moderation and with a lot of care to ensure quality and proper preparation. Find a safe source of nuts or seeds and stick with that. For me, I have found that I tolerate sunflower seed butter and macadamia nuts very well, as well as the few almonds that are contained within my favorite Cherry Pie Larabar.

Spirulina is a wonderful plant protein and a fantastic source of vitamins and nutrients. I add spirulina to all of my smoothies, and I used to add it to juice (which I rarely drink anymore, too much sugar). Spirulina is a primitive micro-algae that grows on the surface of ponds. Micro-algae are very ancient organisms that exist on the border of the plant and animal kingdoms, giving them unique nutritional properties. Spirulina is very high in chlorophyll, which is purifying (i.e. promotes wound healing through anti-microbial activity, detoxifies and deactivates carcinogens), anti-inflammatory, and improves organ function and cellular regeneration (i.e. builds blood, promotes beneficial intestinal flora, improves liver function, activates enzymes for better absorption of vitamins A, E, and K). It has a very high beta-carotene content. Spirulina is also very high in nucleic acids (RNA and DNA) which help with cellular regeneration. Per gram it has the highest protein content of pretty much any whole food on earth. It also contains plant-form omega-3's and the anti-

inflammatory omega-6, GLA. Much of its carbohydrate and protein content is in forms that are essentially pre-digested and rapidly assimilated, so spirulina has been used to treat people suffering from extreme deficiencies or recovering from starvation [1]. Spirulina is a really incredible food, and its dual qualities of cleansing and regeneration make it a very beneficial supplement to a healing diet.

If you're the kind of person that works out or does intense exercise and takes protein as a supplement for building muscle, it's important to find the right kind of protein supplement. Protein powders are often used in shakes and in protein bars. I have done a lot of research and experimentation recently with protein powders, as I am hoping to gain weight through gaining muscle mass. It's pretty hard to find protein powders out there that are not completely denatured, dairy-based, or loaded with sugars, chemicals, and unabsorbable synthetic vitamins and minerals. We cannot eat whey protein because it is dairy-based (may contain lactose and casein) and is most likely denatured and over-processed to the point of being toxic. We cannot eat soy-proteins because of their hormone-mimicking qualities and their high content of anti-nutrients such as phytic acid. Grain proteins, such as brown rice bran powder, are also not recommended because of their possible impact on a leaky gut. So what I've come to settle on is hemp protein. Hemp protein powder is a whole food, it has a wide amino acid profile, contains omega-3's (including GLA), and has a good amount of calcium and iron along with other vitamins and minerals. Furthermore, it is low in anti-nutrients that block uptake of minerals, unlike many other nut or seed proteins. Also, it's relatively inexpensive, cheaper than a lot of regular old whey proteins. If you decide that taking a protein powder supplement is important for your diet, I think hemp is the best choice. Make sure that when you make your protein shakes that you adhere to the food combining rules, or it will make it very hard to digest. I use [this brand](#) of hemp protein, as it's raw, cold-milled (minimizing rancidity), and minimally processed.

The Problem with Legumes

The fruits or seeds of legume plants (i.e. beans, peas, lentils, carob, vanilla, peanuts, soybeans) are similar to grains in that they are the reproductive organs of plants made up of complex carbohydrates and proteins. Like grains, they use self-defense mechanisms such as enzyme inhibitors and anti-nutrients (e.g. phytic acid) to deter predation. Legumes, grains, nuts, dairy, and nightshade plants contain proteins called lectins. Lectins are bound to carbs in these foods and are very hard for our bodies to break down. Digestive enzymes only do a partial job on them, and that is why traditional cultures developed techniques such as soaking and fermenting to pre-digest these proteins before ingesting them. The modern diet doesn't do any of this pre-digestion, and so our society is now rampant with auto-immune diseases, leaky gut syndrome, and food allergies. As it turns out, GMOs may be higher in lectins than their peers because they are spliced into plants to further deter predation. Like prolamins discussed in the [carbohydrate section](#), lectins can cause openings between the cells of the intestinal wall, allowing lectins and other proteins, bacteria, and toxins to leak into the blood stream, triggering an immune response, which can lead to an autoimmune response [8]. Furthermore, it is possible that because the lectin is essentially undigestible, the carb bound to the lectin goes undigested as well and can therefore feed bacterial fermentation in the gut, further contributing to leaky gut syndrome. Essentially, it's your best bet to stay away from legumes, at least until you are absolutely sure you've

healed your gut and no longer have leaky gut syndrome (this usually takes years). The most important legumes to stay away from (in addition to grains) are soybeans and peanuts, which are highest in lectins.

The Best Meats to Eat

So given all this information, what proteins *should* we be eating? Each animal has its own characteristics based on its energy signatures, its intelligence and behavioral patterns, its lifestyle, how and where it was raised, and its spiritual qualities. Therefore, I have chosen to emphasize certain meats in my diet based on their healing properties. Paul Pitchford [1] goes into great detail about this, but I will briefly go through what I feel to be the best sources of protein we should eat.

Seafood - By far the healthiest protein source out there. Includes, fish, shellfish, and crustaceans. Choose the fattiest fish you can afford (salmon, char, mackerel, herring, anchovies, sardines, etc.) as these contain the highest amounts of the anti-inflammatory omega-3's EPA and DHA. Shrimp and clam also have healing properties that treat inflammation and relieve mucus conditions. In Chinese Medicine, seafood is prescribed to treat lung ailments [1]. There is concern over the sustainability of our global fisheries, as they are being overharvested to the brink of collapse in many regions. Therefore, I suggest you regularly refer to the guide that the [Monterey Bay Aquarium Seafood Watch](#) puts out. They also have a free guide that you can download to your [smart phone](#), so you can be sure to buy the most sustainable fish while strolling through the grocery store. There is also some concern about toxic contaminants and heavy metals in seafood. Chris Kresser did a wonderful piece on this issue, so I will refer you to [his article](#). Seafood is my favorite animal food for a million reasons, but one of them is that it tastes fantastic raw.

Pastured, Humanely-raised Pork - In Chinese medicine, pork is a meat with neutral thermal characteristics (thus not contributing to inflammation or internal heat as much as warming meats, like lamb and chicken) and is used medicinally to lubricate the body, build the yin fluids, and treat *dryness*. This last aspect, the building of yin fluids, is very important for CFers, as our mucus is too thick and must be lubricated and thinned out. Pig meat and pig fat (lard) do a very good job of this. Pigs are naturally very fatty animals, which is fantastic for CFers who need more calories than other people. Pork does contain more omega-6 fatty acids (the inflammatory kind) than grass-fed beef, but less than chicken. However, the role it plays in building the yin fluids may outweigh the drawbacks of its higher omega-6 content. Lard is a saturated fat and very good to cook *everything* with, plus it adds a great flavor. I get my lard by saving the oil left over in the pan when I fry bacon. Put it in a glass jar and keep it in the fridge. Pork is also a salty meat, which is beneficial for CFers who need a higher-salt diet. Choose the fattier cuts of meat, like pork belly, as they are more nutritious and higher-calorie. Bacon is a great meal or snack, and it can be added to lots of recipes for extra flavor. However, make sure your bacon is uncured, contains no nitrates, and uses minimal sugar or a natural sweetener, like maple syrup. You may be able to talk to your local farmer and order sugar-free bacon. Never eat conventional or CAFO-raised pork. It is inhumane, unsafe, and unhealthy. Make sure your pork is pastured, organic, certified human, and/or organic. For more info on food labels and what they mean see my page [How to Buy Food](#).

Grass-fed, organic, local beef - Second to pork, beef can also be healing, yet it is considered to be more *warming* and thus not as good for inflammatory diseases like ours. Yet it can be medicinal for other reasons. I've discussed this extensively, but grass-fed beef contains a beneficial balance of omega-3's to 6's, has a lot of naturally occurring vitamins and minerals, and when properly pastured can actually improve the health of a rangeland ecosystem. Furthermore, in Chinese Medicine, beef is prescribed to treat digestive issues of the pancreas and small intestines. The organs and bones of beef are also beneficial and full of vitamins and minerals. Beef liver is particularly nutritious and very high in absorbable vitamin A, an immune-booster. Buy grass-fed beef from your local farmer or farmer's market. If you don't have access to these, it should be available at your local coop or health food store. A few smarter grocery stores might carry it too, but make absolutely sure it says "grass-fed" and organic.

There are many other types of meat to choose from that may be more or less helpful for your particular body, but seafood, beef, and pork are what I choose to use as medicinal meats. Some other animal foods are contraindicated for mucus conditions such as eggs (although just the egg whites might be beneficial). Chicken is higher in inflammatory omega-6's so it is not recommended unless you use the whole bird in a soup or broth. Just eating the meat is not particularly beneficial compared to the higher nutrient profiles of other meats.

How Much To Eat

As far as protein goes, we need varying levels depending on how much healing or growing we are doing at the time. Folks who work out more need more protein as they are building muscle, and folks who are sick need more protein for tissue healing. Healthy people can do very well on 10-15 grams of protein per day. I would think that CFers need a bit more than that. I get about 15-25% of my daily calories from protein, which usually amounts to somewhere between 60 and 80 grams per day. This is not to say that this is ideal for you, it's just what I do, and I'm still experimenting. I am constantly battling serious infections, so my protein needs are pretty high all of the time. Experiment and see what works best for you.

Sources:

[1] *Healing with Whole Foods*. Paul Pitchford.

[2] *Digestive Physiology of Herbivores*.

<<http://www.vivo.colostate.edu/hbooks/pathphys/digestion/herbivores/>>

[3] Lecture by Sally Fallon at the Traditional Foods Symposium at Shelburne Farms. June 15, 2013.

[4] Lecture by Dr. Terry Wahls on the Mitochondrial Diet.

<<http://www.youtube.com/watch?v=wg216KCxSM>>

[5] <http://www.westonaprice.org/basics/adventures-in-macro-nutrient->

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[6] *Protein and Calcium: Antagonists or Synergists?* <<http://ajcn.nutrition.org/content/75/4/609.full>>

[7] *Nourishing Traditions*. Sally Fallon.

[8] <http://www.marksdailyapple.com/lectins/#axzz2Ah7hSjy4>

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[10] <http://www.marksdailyapple.com/human-interference-factor/#axzz1kPKpqtUA>

[11] <http://chriskresser.com/fukushima-radiation-cavities-and-liver-disease>

VII. Medicinal Foods

In my section on protein, I have mentioned specific protein sources that are medicinally beneficial for the lungs and digestive tract. These include: gelatin and bone broth, which help heal the cells in the gastrointestinal tract and build the *yin* fluids; seafood, which is high in fat-soluble vitamins and anti-inflammatory fats; as well as grass-fed beef and beef organs (specifically liver), which benefit the pancreas and digestive system, and provide readily-available vitamins and minerals.

In addition to these healing proteins there are many vegetables and a few fruits that have very strong medicinal properties and can be used liberally in our diets. Most vegetables are very good for us and should make up the majority of our diet, however I have outlined below the several vegetables and fruits that are specifically indicated to treat infections, thick mucus, lung issues, digestive problems, and to boost the immune system. These veggies and fruits can be used most effectively to treat illness when eaten, cooked, or prepared according to their seasonal alignments. That is, eating more salads and smoothies in the summer, and more soups and baked dishes during the winter. Also, eating veggies locally-grown and in season ensures that our bodies are getting the right balance of nutrients they need according to the seasons, e.g. leafy greens in the spring, berries in the summer, pumpkins in the fall, carrots and beets in the winter.

In recent years there have been a great many studies on the cancer- and infection-fighting properties of fruits and vegetables. Many of these studies have quantified their phytonutrients (micronutrients contained in the plant tissue, e.g. calcium, magnesium, vitamin K) and antioxidant levels. As a reminder, antioxidants are very important in help our body fight infection, repair tissue, and eliminate cancer cells. By blocking the actions of free radical electrons, or oxidants, antioxidants protect our cells from damage and also inhibit the growth and reproduction of pathogens. Antioxidants are also anti-inflammatory, as they neutralize oxidants that exacerbate inflammation. With all of the infection-fighting and inflammation that CFers have to deal with, our diets should be LOADED with antioxidants to ensure that our immune system has the tools it needs to get the job done.

I have divided this section on medicinal foods into three subsections:

- A) The Five Flavors
- B) Medicinal Vegetables
- C) Medicinal Fruits

The Five Flavors

Before I dive into which vegetables and fruits are specifically good for CF, it is important to touch briefly on the topic of the five flavors according to Chinese medicine. In Chinese medicine, foods and herbs are characterized by their predominant flavors: sweet, salty, bitter, sour, and pungent (spicy). Each of these flavors corresponds to an element, a season, an organ system, and a variety of other human and environmental phenomena.

Of the five flavors, I believe bitter is the most beneficial for CF. It helps clear up mucus problems, improves digestion, fights infection, reduces inflammation, treats constipation, and strengthens the liver's ability to cleanse the body [1]. The American diet is woefully lacking in the bitter flavor, but it becomes very enjoyable once you develop a taste for it. In nature, the bitter flavor is a clear sign that a plant is high in antioxidants and phytonutrients [2]. The bitter flavor is known to strengthen the kidneys and lungs, and is especially good at clearing mucus and heat in the lungs (i.e. infection). It is specifically used for "damp-heat" conditions, which would mean diseases with a lot of phlegm and inflammation, as well as chronic infection. Bitter foods that are especially good for the lungs are alfalfa, dark-leafed lettuce, asparagus, celery, the *peel* of citrus fruits, radishes, scallions, and apple cider vinegar. Bitter herbs are also especially good including dandelion leaf and root, burdock leaf and root, yarrow, chamomile, chaparral, echinacea, and pau d'arco [1]. Several of these herbs are especially strong, so research them or talk to your herbalist before taking them. Like anything, bitter can be eaten in excess. In excess, bitter would have the effect of being too cooling, and can possibly lower immunity, making the lungs more susceptible to infection. Like everything, bitter foods and herbs must be eaten in moderation. If you find yourself feeling too cold or becoming more susceptible to infection after eating a lot of bitters, cut back and see if that helps.

There are two other flavors that are secondarily beneficial for CF: pungent and sour. Pungent foods like spices and spicy vegetables stimulate the digestion and disperse mucus. Garlic, mugwort, and cayenne are particularly good at this. There are two classifications of pungent foods, warming and cooling. When we've got a lot of inflammation or a high fever, we should make sure we take the cooling pungents like white pepper, peppermint, majoram, elder flowers, and radishes. When we are chilled, have caught a cold, or have a low-grade fever that needs to be stoked up to kill pathogens, take warming pungents like cinnamon, ginger, black pepper, all hot peppers, basil, horseradish, mustard greens, fennel, anise, dill, and nutmeg. In other words, eat some spicy Indian or Thai food! When I've got a low-grade fever that I need to break, I often drink a mug of "Bengal Spice" tea by Celestial Seasonings.

Like the bitter flavor, sourness and astringency are also signals that a plant is higher in phytonutrients [2]. Sour foods are great for breaking up fats and protein for easier digestion, making nutrients easier to absorb. It is also used to strengthen weakened lungs. Traditional East Asian cuisine usually begins with an appetizer of something sour, usually a pickled vegetable, to stimulate the digestion and get the GI tract ready for oncoming fats and proteins. For this reason, it is a good idea to start a meal with a tablespoon of

sauerkraut or a small pickle. You can also put slices of lemon in your drinking water at your meals. Other sour foods include lemons, limes, very sour apples (crabapples), vinegar, leeks, blackberries, sour grapes, raspberries, huckleberries, olives, and tomatoes.

As far as the other flavors, salty moistens hardened and dry tissues in the body. This would be useful for CF in that our mucus is generally too dry and must be moistened in order to make it easier for us to clear out of our bodies. This is what inhaled hypertonic saline accomplishes. The sweet flavor (which refers not to what modern people consider sweet, like sugars and fruits, but refers more to the mild sweetness of grains, legumes, and starchy vegetables like roots and winter squash) is nourishing, tonifying, and balancing, making this flavor important for the treatment of those who are very weak and have reduced vitality [3].

Sources:

[1] *Healing with Whole Foods*. Paul Pitchford.

[2] *Eating on the Wild Side*. Jo Robinson.

[3] *Herbal Medication*. Priest and Priest.

Medicinal Vegetables

Garlic - Garlic is an herb, a food, and a medicine. It is truly a powerful plant that can be used in a million applications. Its flavor is strongly pungent. Garlic has incredibly powerful anti-microbial properties, and the main phytochemical in garlic, allicin, has been shown to be effective in killing many different bacteria including MRSA [4]. Furthermore, “one milligram of allicin, the main active ingredient in garlic, is equivalent to 15 international units of penicillin. Each clove has from seven to thirteen milligrams of allicin, so three cloves contains the same antibacterial activity as a standard dose of penicillin” [2]. The spiciness of garlic is created by the sulfur-based nutrients called thiosulfates, which kill cancer cells and reduce the risk of arterial blood clots [2]. Garlic is extremely high in antioxidants, and will attack and neutralize free radicals quicker than another other substance on the planet [7]! Eating garlic raw in a one-clove dose at least two times a day during an infection is recommended. If you can eat more, do it. You can't overdose on it, but it'll make your breath stink if eaten raw (that's how you know it's working - it is released into the blood stream in the lungs, aerosolized, and breathed out, filling your airways with anti-bacterial allicin). **VERY IMPORTANT:** in order to release the oil that contains allicin, you must **CRUSH** the clove at least 10 minutes before eating or cooking with it. If you do not do this, the garlic will not be nearly as effective in killing bacteria and other microbes in your body. Once the clove is crushed and sits for 10 minutes it can be cooked without damaging its antimicrobial properties. One way to make raw garlic more palatable is to crush the clove then chop it in tiny pieces and mix it in a teaspoon of raw organic honey. I've heard that raw garlic can give some people stomach aches a few hours after eating it, so in this case you can cook it, as long as it's crushed beforehand. You can also eat fresh parsley or drink wheat or barley grass juice with raw garlic to reduce the risk of “garlic breath”.

Onion – In Chinese medicine onions are used to reduce phlegm, fight infection, and help digest proteins [1]. Its predominant flavor is pungent. In a 2009 study, quercetin, the main phytonutrients in onions, killed type A flu virus better than Tamiflu, the drug that the government stockpiles during flu outbreak scares. Like garlic, extracts of onion are extremely efficient at killing human cancer cells, 100% and 95% effective, respectively. But only the less-sweet, spicier onions are the most effective at killing cancers, and have significantly more antioxidants and phytonutrients. The spicier onions have up to eight times more antioxidants than the average yellow sweet onion. In addition, smaller onions are more concentrated in antioxidants than larger onions. Small, red onions are much higher in antioxidants, and if you have a wide variety of choices at your local farmer's market, pick small red onions, scallions/green onions, shallots, or chives. Chives are especially nutritious and have more antioxidants than the hottest red onion. Scallions are also a better choice, and make sure to eat the leaves. A good rule of thumb is that if your onions make you cry when you cut them, they are very nutritionally dense. But don't worry if you're not a fan of spicy onions - sautéing hot onions for a few minutes will mellow their spice and bring out their sweetness. The most nutritious varieties to ask for at the farmer's

market (or to grow in your own garden) are Red Walking onions, Red Baron onions, Red Wethersfields, New York Bolds, and the Western Yellow. One other thing to keep in mind is that onions concentrate their phytonutrients in their skins [2], so save them to make soup stock or add to your bone broth.

Leafy Greens and Lettuce – Most leafy greens are categorized as sweet and bitter, although kale is also pungent. As with most vegetables and fruits, the darker green or purple your leafy greens are, the more antioxidants and phytonutrients they contain. Furthermore, wild vegetables, especially greens, are more nutritious than cultivated vegetables. A few of the most medicinal of the leafy greens are dandelion greens (yes, that weed growing out in your garden – go eat it!), kale, purple lettuce, lamb’s quarters (also a “weed”), and arugula. Compared to these guys, spinach is pretty lame (but still good for you). Lamb’s quarters are absurdly nutritious and recent studies have shown that they are effective in fighting cancer, viruses, and bacteria. Compared to spinach, dandelion greens have eight times more antioxidants, two times more calcium, three times more beta-carotene, and five times more vitamin K and E. Calcium tastes bitter, so the more bitter your greens, the more calcium they’re likely to contain [2]. I like to sauté my greens or put them in a soup. I also add kale and lettuce to my smoothies – you can hardly taste it, really.

In terms of lettuce, it is prescribed to dry damp conditions involving mucus production and is cleansing. With its mild flavor, it’s really great to add to your smoothies for extra nutrition and a dose of chlorophyll. Lettuce is also one of the easiest leafy greens to digest, so it can be eaten raw and combined with a whole variety of foods including fruit, fats, and proteins. Red, purple, and reddish-brown lettuce contains the highest levels of a phytonutrient called anthocyanin, which is a pigment and antioxidant (the same one that gives blueberries their blue color). The antioxidant lutein in dark green veggies protects the eyes and calms inflammation. In addition to dark greens and reds, look for loose-leafed lettuces, not those that grow in a tight head. The evidence on this is that the more the leaves are exposed to sunlight, the more antioxidants are created to protect those leaves from the sun (like sunscreen). A very useful bit of info that I gleaned from *Eating on the Wild Side* by Jo Robinson, is the importance of properly storing leafy greens and other veggies in order to preserve their antioxidant content. I highly suggest you read her book or visit [her website](#) to get more details on this. But for leafy greens specifically, seal them in an airtight plastic bag, squeeze out the air, then poke 20 tiny holes in the bag and store it in the crisper drawer of the fridge. Leafy greens oxidize very rapidly, and so their phytonutrient and antioxidant content can be significantly reduced within a couple of days. By storing the greens properly you preserve a significant amount of the antioxidants, but in order to make the most of them you’ve got to eat the greens the day of harvest or within a few days. This is just one reason to grow your own food or buy it from the farmer’s market – the fresher it is, the more medicine is in it! Jo Robinson mentions, “if the vegetables are freshly harvested, they are among the most healthful foods of all. But by the time they are shipped, warehoused, displayed in the supermarket, and stored in your home refrigerator, they can lose up to 80% of their beneficial nutrients. Their natural sweetness disappears as well, and their bitter flavors become more intense. Furthermore, if you cook the vegetables

in the most common way [i.e. boiling them], very few nutrients remain” [2]. Maybe Americans are eating less and less fruits and veggies not just because they eat more junk food, but also because the profit-driven agro-industrial complex has made fruits and veggies less tasty and less nutritious? The solution is to buy local or grow your own.

I’ve decided that kale needs a special mention in this section, since it has a special place in my heart. Kale is a crucifer, a highly nutritious family of veggies that includes cabbage, broccoli, Brussels sprouts, cauliflower, collard greens, arugula, mustard greens, radishes, kohlrabi, and turnips. Kale is the most nutritious of all the crucifers (a very impressive family as a whole). In Chinese medicine, kale is used to ease lung congestion, and it is extremely rich in chlorophyll, calcium, iron, and beta-carotene [1]. It is extremely high in antioxidants, and its nutrient profile rivals that of wild greens. Awesome factoid: one serving of kale has more calcium than 6 oz. of milk [2]! Red leafed kale is higher in antioxidants than green kale, although I sure do like the funny rumples of dino kale! Here in Vermont, we have a saying: EAT MORE KALE! Well, I guess that’s kinda more of a demand than a saying. But I’ve heard that a brigade of local [kale-worshippers](#) is attempting to make kale the state vegetable. I’d vote for that. Store kale like lettuce. You can cook it (sauté or steam, NOT boil unless in a soup where you drink the water) or add it raw to smoothies. Kale and other leafy greens must be bought organic as they are on the “Dirty Dozen Plus” list.

Mustard greens are similarly beneficial to kale (also in the crucifer family) although spicier in flavor. They are also used to treat lung congestion. Add to stir-fry’s and soups, or use raw in a salad or smoothie for a spicy adventure.

A note on oxalic acid: it is an anti-nutrient that several vegetables use to protect themselves from predators, like us. When eaten, oxalic acid binds to calcium and other minerals in your body and carries it out. Demineralization of the bones and tissues happens on a very small scale, so there is no need to worry too much about oxalic acid unless you consume a significant amount of it every day. There are three leafy greens that are high in oxalic acid and these should be eaten in moderation: spinach, chard, and beet greens. Other foods that are high in oxalic acid are cocoa/chocolate, quinoa, parsley, and leeks [3].

Cabbage – Cabbage is another highly nutritious member of the crucifer family. Its predominant flavors are sweet and pungent. In Chinese medicine it is used to improve digestion, treat constipation, colds, whooping cough, heal wounds, and is effective in ridding the system of parasites. Cabbage is higher in vitamin C than oranges, and contains significant amounts of vitamin E and calcium in the outer leaves. Cabbage made into sauerkraut is a fantastic probiotic and appetizer. Napa cabbage is specifically used to treat inflammation and conditions with yellow mucus discharges [1].

One of the best things about cabbage is that it keeps very well in the crisper drawer of the fridge for weeks. Cook cabbage briefly or eat raw to maintain its antioxidant capacity and to reduce its ability to stink. I really like napa cabbage in my stir-fry’s. Red cabbage has six

times more antioxidants than green cabbage, so choose red or purple cabbage when you have the chance. Cabbage is also great for juicing. A really great low-sugar, high-antioxidant juice is carrot, red cabbage, and celery juice. The carrots make the juice taste sweet, but it is much lower in sugar than fruit juice. Brussels sprouts are similarly nutritious to cabbage but respire quickly like kale.

Celery – Celery is used in Chinese medicine to dry up dampness and mucus problems, and it benefits the pancreas and digestive system. Its predominant flavors are sweet and bitter. It can also be eaten in combination with pretty much any food [1]. Eating a stalk of celery can be helpful in quelling sugar cravings. It makes a great juice that is indicated for treating diabetes, and is good to add in soups. I also like to use it as a vehicle for nutbutter plus some raisins or other unsweetened dried fruit for “ants on a log”. The nutbutter makes it a high-calorie quick snack. Celery must be bought organic, as it is on the “Dirty Dozen” list of pesticide-ridden veggies.

Carrots – Carrots strengthen the digestive system and are used to soothe coughs and gut irritation. Its predominant flavor is sweet. They are a “safe starch” in that they are very easy to digest when cooked and will not feed bacterial fermentation in the intestines. For this reason they are one of the only root vegetables that are allowed on the Specific Carbohydrate Diet. Orange carrots are high in beta-carotene, an antioxidant and vitamin A precursor, which is beneficial in fighting infections and inflammation [1]. A fun fact is that the orange carrot is a mutant created in the 1500s in the Netherlands as a political statement. Before then all carrots were yellow, white, red, purple, or green. But the most nutritious of all carrots are the red and purple carrots. The purple-yellow carrot (purple outside yellow inside) has about 13 times more phytonutrients than the orange carrot. Red and purple carrots contain high levels of another antioxidant, anthocyanin, which may be even more beneficial than beta-carotene. Purple carrots are higher in beta-carotene anyway, and are actually sweeter than orange carrots. A fascinating study determined that regularly drinking purple carrot juice helped rats fed on the toxic Standard American Diet return to normal health – reducing inflammation, lowering blood pressure and cholesterol, lowering blood triglyceride levels, and, most importantly, improved glucose response [2]. Even though carrots do contain a significant amount of sugar, the benefits of the phytonutrients in the purple variety may outweigh the harm of their sugars. In my personal experience, carrot juice has not caused me blood sugar spikes or reactive hypoglycemia.

There are some important things to know about carrots to optimize their nutrition. First, buy them with the green tops on them, which is an indication of their freshness. Second, never peel carrots, always eat the skin. That’s where a majority of the antioxidants lay. Third, cooking carrots actually increases their nutrient availability, but they should be steamed, sautéed, or baked, not boiled. As with other veggies, boiling essentially leaches all of the nutrients into the water and leaves few left in the vegetable. In order to best absorb the beta-carotene in carrots they must be steamed whole, then chopped afterward and

served with fat (olive oil, bacon fat, ghee, etc.). Lastly, store raw carrots in a sealed plastic bag in the crisper drawer. The older they get, the less sweet they become, so eat them fresh!

Beets – Beets, like purple carrots, may be one of those overlooked superfoods that don't get much attention. Like carrots, they are a sweet root veggie high in sugars, but with a relatively low glycemic load. While the sugar profile of carrots includes glucose, fructose, and sucrose, the sugar in beets is pretty much 100% sucrose. Before I launch into the benefits of beets, please be aware of the sugar content in beets, and check your blood sugar to see if they cause you hyperglycemia or reactive hypoglycemia. That said, beets are incredibly nutritious and have been used as medicine all over the world for millennia. Beets are a good source of fiber, folate, and potassium, and are higher in antioxidants than almost all other domesticated vegetables except for artichokes, red cabbage, and kale. The beet's red-pigmented antioxidant betalain is 85-100% effective at killing cancer cells in-vitro. *Here is the most important and remarkable info relevant to CF:* the nitrate in beets reduces the amount of oxygen required by your muscles during exercise, and studies have shown that this effect increases endurance and athletic stamina. One study showed that beet juice helps sedentary people (or those with pulmonary or cardiovascular disease) walk longer distances with less effort, an important finding for those CFers who are suffering from severely impaired lung function and fatigue. Another study showed that eating beets helps athletes run faster, which prompted the British Olympic team in 2012 to drink beet juice instead of Gatorade before their events. British runner Mohamed Farah went on to win the gold medal in the 5- and 10-km races [2]. Beets and carrots are the only root vegetables allowed on the Specific Carbohydrate Diet and the GAPS diet.

In order to get the most out of your beets, choose the most nutritious varieties and cook them as you would carrots (see above). Choose the darkest red beets you can find, preferably with the beet greens still attached (these are edible as well and very nutritious) – the greens are an indicator of their freshness. At the farmer's market or in your own garden, choose the darkest red of the varieties, especially Ox Blood and Red Ace.

Daikon radish – Daikon is indicated for treating phlegm in the lungs, clearing up and expelling mucus, moistening the lungs, relieving indigestion, and detoxifying the body. Its predominant flavors are sweet and pungent. It is cooling and treats heat-related conditions like hemoptysis (coughing up blood) and headaches. Radishes are a member of the nutritionally-outstanding crucifer family. Radishes were used as a traditional Western remedy for gallstone, kidney stones, and bladder stones. They are also helpful in protecting against colds and flus [1]. You can add daikon raw to a salad for a little spice, or put it in a stir-fry to add some texture. They mellow when cooked and absorb flavors very well when sautéed or put in soups. Daikon is a mainstay of East Asian cuisine, and you can ferment it along with cabbage and spices to make awesome kimchi. Daikon is rich in vitamin C, copper, magnesium, and folate. The leaves are also medicinal, but harder to come by.

Mushrooms – Mushrooms, specifically the white button mushroom that you can most easily buy at grocery stores, are specifically indicated for treatment of lung congestion and infection. They are cooling and are categorized as sweet. Eating mushrooms satisfies the Chinese concept of “like heals like”, or in this case, pathogen kills pathogen. Since mushrooms are a fungus and grow as pathogens on trees, eating them introduces competition in your bodily ecosystem, starving out other pathogens. Of course, these edible mushrooms are not going to “colonize” you; they are completely harmless. But the concept works more on an energetic level - using the benign “pathogen” to kill the malignant pathogens that cause infection. Mushrooms have antibiotic properties and stimulate the immune system, boosting the white blood cell count to fight infection. Mushrooms also stimulate appetite, something that we CFers may need once in a while. They are high in B vitamins, the antioxidants selenium and ergothioneine, as well as copper and potassium. Mushrooms are also effective in fighting and preventing a variety of cancers [4]. Add them to stir-fry’s and soups. It is not recommended to eat them raw.

To find even more medicinally beneficial mushrooms, head to the woods! But you’ve got to know what you’re doing before you go eating wild mushrooms – some of them are toxic and deadly; others are just damn tasty. Seek out a foraging expert to take you on a hunt; going only by a mushrooming book is generally not a good idea.

Pumpkin – Pumpkin is a cooling, sweet, and slightly bitter vegetable that is one of the only “safe starches” (along with carrots and other winter squashes) allowed on the gut-healing Specific Carbohydrate Diet. In Chinese medicine it is used to relieve mucus conditions in the lungs and throat, encouraging expectoration. Regular use can help treat asthma. It is also used to control blood sugar (in replacement of high-glycemic carbs) and strengthen the pancreas. Pumpkin seeds are used to expel parasites in the gastrointestinal tract [1]. Pumpkins are very high in beta-carotene, an antioxidant that improves mucus membrane health. It is a good source of polyphenolic flavonoid compounds and B vitamins [5]. They can be baked, cubed and steamed, or added to soups. Do not boil them or they’ll lose most of their nutrients to the water. Can be used as a replacement for sweet potatoes. Although pumpkins have a somewhat low glycemic index because of all the fiber, they do contain a good amount of carbohydrate, so watch your blood sugar when eating them.

Seaweed – Seaweeds and microalgae (spirulina) are extremely nutrient-dense, containing from ten to twenty times more minerals than land plants, given their constant exposure to nutrient-rich waters. Seaweeds are cooling and salty, used to transform phlegm, treat chronic coughs with yellow or green mucus, and rejuvenate the lungs. Seaweeds are excellent sources of iodine, calcium, iron, and many trace minerals. Because they are so nutrient-rich, they can be taken in very small doses to be effective. The seaweeds hijiki,

aramé, and wakame have ten times more calcium than cow milk. Kelp and wakame have four times more iron than beef [1]. Dulse flakes can be sprinkled on food in replacement of salt or just for some extra flavor. Wakame can be eaten as a crunchy snack like beef jerky, or rehydrated and added to stir-fry's or soups. Kombu is a type of kelp that is thick and very nutritious. It is a natural fungicide and helps clear up yeast infections, and is said to help increase the depth of breath [1]. It is great to add to soups and soup stocks. Nori (what sushi rolls are made out of) makes a great crunchy snack, a wrap, or can be crumbled on top of any food for extra flavor and nutrition. There are U.S. companies that grow seaweeds on both the Pacific and Atlantic coasts, so try to get your seaweeds from a source as local as possible. I get mine from a tiny company in Maine that sells their seaweeds at my coop. When you can, try to avoid seaweeds that are grown and packaged in China, Korea, or Japan. Their carbon footprint is enormous, we generally don't know enough about their environmental regulations to assess the cleanliness of the waters that these seaweeds were raised in, and we don't know what kinds of chemicals or food additives have been used in the packaging process. So support more local seaweed harvesters when you can. On another note, on a whole-foods diet we generally want to stay away from the low-quality salts that are fortified with iodine (e.g. kosher salt) and instead choose high-nutrient sea salt or Himalayan salt. But since sea salt and Himalayan salt are not fortified with iodine, it is important to get your iodine from somewhere, and seaweed is incredibly high in iodine - just 0.2 teaspoon of [raw kelp flakes](#) will provide you with 2,260% of your daily needs. That might seem high, but you can't really overdose on a whole-food source of iodine, although it might be a different story for synthetic iodine.

Spirulina – Micro-algae (spirulina, chlorella, and wild blue-green algae) are some of the most ancient life forms on earth. They have more chlorophyll than any other plant, a molecule that is pigmented green and involved in photosynthesis. Chlorophyll itself is purifying (i.e. promotes wound healing through anti-microbial activity, detoxifies and deactivates carcinogens), anti-inflammatory, and improves organ function and cellular regeneration (i.e. builds blood, promotes beneficial intestinal flora, improves liver function, activates enzymes for better absorption of vitamins A, E, and K). Micro-algae are very ancient organisms that exist on the border of the plant and animal kingdoms, giving them unique nutritional properties. Spirulina is a primitive micro-algae that grows on the surface of ponds, and is the most well-known of the micro-algae. It has a very high beta-carotene content. Spirulina is also very high in nucleic acids (RNA and DNA) which help with cellular regeneration. Per gram it has the highest protein content of pretty much any whole food on earth. It also contains plant-form omega-3's and the anti-inflammatory omega-6, GLA. Much of its carbohydrate and protein content is in forms that are essentially pre-digested and rapidly assimilated, so spirulina has been used to treat people suffering from extreme deficiencies or recovering from starvation [1]. Spirulina is the cheapest of the micro-algae to buy and it is beneficial in small doses, a teaspoon or two in a serving. I add it to my smoothies or to vegetable juice. Plus, it gives your food a beautiful deep blue-green color!

Alfalfa powder – Alfalfa is a highly nutritious grass that, with its deep and extensive root system, absorbs a great amount of minerals, including trace minerals. It is a bitter plant, clears up mucus conditions, benefits the intestines, and detoxifies the body. It provides many nutrients including beta-carotene, iron, calcium, magnesium, potassium, phosphorus, sodium, sulfur, silicon, chlorine, cobalt, zinc, and vitamins K and P [1]. I add alfalfa to my smoothies and veggie juice. It has a very earthy flavor, which I like a lot. I add about 2-3 teaspoons into a smoothie.

When it comes to fortifying our smoothies, high-calorie shakes, and other foods with vitamins and minerals, doing so with whole-food sources such as spirulina and alfalfa is much more beneficial and absorbable than consuming them as those synthetic nutrients that food and drug corporations use. Studies have shown that many of those synthetic or low-quality sources of vitamins or minerals are poorly absorbed because they are not assimilated within the context of a whole food. Our bodies were designed to absorb vitamins and minerals in certain specific configurations in food, and synthetic nutrients are often formulated in a way that reduces absorbability or blocks absorption of food-borne nutrients. A good example of this is folic acid, which is added to a lot of foods these days. Folic acid is a difficult-to-absorb form of folate, and it blocks the uptake of absorbable folate in the form of l-methylfolate. Folate is a critical epigenetic regulator, and is extremely important in the diets of pregnant women and growing children. The best sources of absorbable folate are leafy greens.

Sources:

[1] *Healing with Whole Foods*. Paul Pitchford.

[2] *Eating on the Wild Side*. Jo Robinson.

[3] <http://www.jrorganicsfarm.com/blog/news/oxalic-acid/>

[4] <http://mushroominfo.com/benefits/>

[5] <http://www.nutrition-and-you.com/pumpkin.html>

Medicinal Fruits

Recommending fruits to take medicinally is pretty tricky, as they are generally high in sugars, which have negative impacts elsewhere in the body. Several fruits are high in antioxidants, nutrients, and enzymes, however most of the common domesticated varieties of fruits that you can buy in the grocery store offer little medicinal benefit and, for people with compromised glucose tolerance, may do more harm than good. So the following list of medicinal fruits is pretty short, as significant fruit-eating is not recommended for people with glucose intolerance, bacterial overgrowth in the gut, mucus problems, or infections.

Lemons, Limes, Citrus Peel – In addition to their high vitamin C content, citrus fruits have a wide variety of other antioxidants and nutrients. Oranges have more than 170 individual phytonutrients identified so far, and 76% of its antioxidant value comes from compounds other than vitamin C. One of these phytonutrients is called hesperidin, which in animal studies has been shown to relieve depression, calm inflammation, protect DNA from radiation damage, and slow cancer growths. However, most of the beneficial compounds in citrus lay not in the soft inner flesh, but in the rind and the pith, the spongy white tissue that lies on the inside of the rind [2].

Eating the sweet inner flesh of oranges and other sweet citrus (tangerine, grapefruit, clementine, etc.) is contraindicated for mucus conditions and infections, however the peel is of great medicinal value as it does not contain much sugar and is full of infection-fighting, anti-inflammatory compounds. The rinds of oranges, grapefruits, lemons, and limes are particularly useful. In Chinese medicine, citrus peel is used to regulate the pancreas and digestive energy, alleviate intestinal pain and indigestion, and to resolve mucus congestion in the lungs. The best way to use the peel is to simmer it in water, fresh or dried, for about 20 minutes and drink it as a tea [1]. You can also grate the rind as a “zest” and add it to any dish for extra flavor and nutrition.

Because limes and lemons have so little sugar content, it is fine to eat the entire fruit including the inner flesh. The oils in the rind are particularly beneficial, however. Lemon’s anti-bacterial, anti-viral, and antiseptic characteristics are very well known, and studies have shown that they are also very effective at killing cancer cells compared to other fruits, second only to cranberries [2]. Both lemons and limes are used in Chinese medicine to treat infections, resolve mucus conditions, and fight colds, flus, and parasitic infestations. Lemons and limes also encourage the secretion of bile for fat digestion and improve the assimilation of minerals from food. Furthermore, lemons/limes are cleansing, can alleviate gas and indigestion, increase the production of *yin* fluids in the body (thinning out our mucus), and are used to treat diabetes [1]. So as you can see, lemons and limes are by far the number one most beneficial fruit for CF! You can add slices to your tea or drinking water to sip throughout the day. You can add them, rind and all, to your smoothies or homemade energy bars, you can bake with them, add their juice to a stir fry for a little tang, or grate the rind onto any dish as a “zest”. Lemons, limes, and citrus rind can be used very liberally. Include some aspect of them into your diet every day.

There are several *very important* points to note when using citrus and citrus rind. First, *only organic* citrus should be used when you are eating the rind, as conventional citrus production is *highly* pesticide intensive and a significant amount of those pesticides are absorbed into the rind of the fruit. The negative consequences of ingesting all of those pesticides laden in the peel may completely outweigh any medicinal benefits you receive from their phytonutrients. Second, vitamin C is destroyed with heat (although several other antioxidants will survive) so limit the amount of heat your citrus is exposed to if you're trying to get all the medicine out of it. For example, slices of lemon in very hot water may destroy its vitamin C, but in warm or cool water you should be fine. Another little factoid to know: limes are ripe when they're yellow! Also, citrus fruits do not ripen after they are picked, so choose the ripest, juiciest ones in the store. Give them a squeeze, and if they're a little soft that means they're ripe.

Berries – There are several types of berries that may be beneficial when eaten in small quantities to limit their impact on our blood sugar. The most nutritious of the berries include blueberries, blackberries, black raspberries, and cranberries. Raspberries and strawberries are also high in antioxidants and phytonutrients. Compared to many other fruits, berries have less sugar and a lower glycemic index, plus they often have a positive glucose to fructose ratio and limited sucrose [3], making them a better choice when dealing with fructose malabsorption and gut dysbiosis. The darker-colored berries, particularly blueberries and blackberries, are the most nutritious of the bunch, having the most antioxidants and phytonutrients. The wild varieties of these berries are much more nutritious than the domesticated varieties, so go foraging for blackberries in the late summer or choose to buy wild frozen blueberries in the store when you can. Blueberries, like purple carrots, seem to be the antidote to the diseases caused by the Standard American Diet. They slow tumor growth, lower blood pressure, reduce arterial plaque buildup, and most importantly, cool inflammation. They also help prevent diabetes and obesity. Recently studies have shown their remarkable ability to slow age-related dementia, and significantly improve cognitive function and memory in the elderly [2].

As fantastic as blueberries are, blackberries are even more outrageously nutritious. Their antioxidant content is higher and they have a lower glycemic index. Of the varieties of cultivated blackberries, marionberries are the most nutritious. Cranberries have one of the highest antioxidant levels of all fruits, and their red color is from the pigmented antioxidant anthocyanins. Cranberries are powerfully anti-bacterial, and studies have shown that they are very effective in clearing urinary tract infections and killing a number of food-borne pathogens, namely staph, listeria, and E. coli. Dried cranberries have only 20% of the antioxidant capacity of fresh or frozen berries, and cranberry juice has about half of the phytonutrients of the whole berry. Studies have also shown that cranberries fight *Helicobacter pylori* [2], the bacteria that causes ulcers in the stomach and duodenum, and can lead to dysbiosis in the intestines caused by [low stomach acid](#). Cranberries make it harder for *H. pylori* to attach to the mucous membranes of the GI tract, reducing the risk of infection. Cranberries must be bought organically as conventional cultivation uses a significant amount of pesticides that not only poison the environment, but stick around on the fruit to poison you too. Cranberry harvesting is from October to December, so buy them fresh and freeze them. Dried cranberries and cranberry juice are not recommended

because both are usually heavily sweetened either with sugar or apple-juice concentrate, which is high in fructose. Unsweetened cranberry juice is fine, but lower in antioxidants. Add cranberries to smoothies, bake with them, or make homemade jam and compotes. One last note: be aware that all berries contain a significant amount of histamine, so if you are [histamine intolerant](#), you may have to hold off on the berries until your gut heals.

Sources:

[1] *Healing with Whole Foods*. Paul Pitchford.

[2] *Eating on the Wild Side*. Jo Robinson.

[3] "Fruits and Sugars". <<http://thepaleodiet.com/fruits-and-sugars/>>

VIII. Nutritional Supplements

We should try our best to get complete nutrition from our diet by eating high-quality whole foods in the right combinations to optimize digestibility. However, since CF digestion is, even at its best, not very efficient, we need to make sure we are getting all of the vitamins and minerals we need for good health, even if we are not able to absorb them from our food. Therefore, supplementing with vitamins and minerals is a must.

Fish oil

Seafood is one of the healthiest foods you can eat. Oily fish are particularly high in the anti-inflammatory omega-3's EPA and DHA. Furthermore, high-quality fish oils are very high in the fat-soluble vitamins that CFers need so badly. But sometimes we can't eat or afford as much fish as we'd like to. So I supplement with the highest quality fish oil I can afford, and that means I choose a high-DHA oil like [Jarrow's Max DHA](#) or [wild salmon oil](#). If I could afford [fermented cod liver oil](#), that would be my first choice. There are a lot of low-quality fish oils out there that are essentially a waste of your money and a strain on global fisheries. In order to make a more complete decision on which fish oil to take, I recommend reading Chris Kresser's article on the subject, [the Definitive Fish Oil Buyer's Guide](#). Remember that all fish oil and fat-soluble vitamin supplements (A,D, E, K) must be taken with a fatty meal and enzymes for proper absorption. Taking them on an empty stomach with no enzymes will not do you much good. Whatever dose is recommended on the bottle - double it. People with CF have such a high burden of oxidative stress that adding extra omega-3's to our diet is a must. In addition, we must strive to reduce the amount of omega-6's in our diet, which are common in vegetable oils and seed oils. If you frequently expose yourself to these inflammatory oils, increase your dose of omega-3's even further. An ideal ration of omega-3: omega-6 oils in the diet is 1:2 - 1:4. The typical American consumes a ratio of 1:10 - 1:20! How inflammatory!

Probiotics

From all the antibiotics we are on, our gut flora are constantly getting disturbed. In addition to killing bacteria in the lungs, oral and IV antibiotics also kill gut bacteria, often the good species that help us digest our food, keep our intestinal cells healthy, and protect us from food-borne pathogens and toxins. These beneficial bacteria include *Bifidobacteria*, *Lactobacteria*, *Propionobacteria*, physiological strains of *E. coli*, *Peptostreptococci*, and *Enterococci*. But our guts are home to around 500 species of microbes that, in a healthy body, live in balance and harmony, as species do in all healthy ecosystems [10]. However, when we start killing off certain species in this fragile ecosystem indiscriminately with systemic antibiotics, the balance of species can get thrown off and we can develop a lack of good bacteria and/or an overgrowth of pathogenic/opportunistic bacteria. A lack of beneficial gut bacteria may cause diarrhea, gas, heartburn, poor digestion, and intestinal pain. In addition, recent research has discovered that an imbalance in the gut flora of CF patients can lead to increased susceptibility to lung infections and exacerbations [12]. As CFers, we should minimize our use of antibiotics because their use can lead to long term

lung function decline [12], but sometimes we don't really have a choice whether or not to use antibiotics - when we get a serious infection, we need them, however unfortunate that may be. So when we do use them, it is very important to try to restore the beneficial bacteria that the antibiotics have wiped out - during antibiotic treatment, afterward, and pretty much always. Studies have shown that supplementation with probiotics in CF, particularly *Lactobacillus rhamnosus GG* (found in Culturelle), reduces the number and length of lung exacerbations, increases body weight, reduces inflammation, and improves FEV1 scores [13]. There are many ways you can take probiotics. The most popular way in our culture is to pop a pill - taking a capsule of several billion bacteria with multiple species and strains. This is well and good, and certainly helps, but the lower-end probiotics don't contain that wide of a wide variety of species, and the actual live bacteria count is often lower than what's labeled on the bottle. There is a tastier alternative that all traditional diets all over the world have used for millennia: fermented foods. These include cultured dairy (*real* yogurt, keifer), sauerkraut, kimchi, kombucha, kvass, fermented grains, fermented meats and fish, etc. Fermented foods contain a much wider variety of species or strains and a greater number of actual live bacteria. Personally, I use both. For best results, I take my probiotic pills just after a meal so that the food buffers and protects the bacteria from direct exposure to stomach acid, which kills our little friends. I also eat a tablespoon of sauerkraut a several times a day, preferably 10-15 minutes before a meal as an appetizer to trigger the production of stomach acid and pepsin. I take probiotics in these ways whether or not I'm on antibiotics. Make sure that if you buy your fermented food at the store it says "live", "raw", or "probiotic" - if it's been pasteurized or cooked in any way after the fermentation process, it is no longer probiotic. Most commercial yogurts you can buy in the grocery store are not probiotic, but you can make your own at home (if you tolerate dairy).

Here are some things to look for when buying a good quality probiotic supplement:

- Contains at least 10 different species of bacteria.
- Contains at least 10 billion CFUs per pill.
- Make sure the label says something like, "potency guaranteed at time of consumption" or "potency guaranteed until expiration date". It should NOT say, "potency guaranteed at time of manufacture" because that means that after the pills leave the factory, there is no guarantee that any of the bacteria will remain alive in them when you consume them.
- The probiotics are encapsulated in such a way to protect them from stomach acid.
- They must be either freeze-dried encapsulated and therefore shelf-stable (like Culturelle and BioKult) or refrigerated throughout the entire chain of transit and in the store.
- If probiotics with *Lactobacillus* in them make your digestive symptoms worse, consider taking a soil bacteria based probiotic, like Prescript Assist.
- Kid formulas have fewer CFUs per capsule, and some aimed at infants or toddlers contain bacterial species known to be found specifically in the infant/toddler gut. However, the adult gut is so multi-factorial that we do not yet know enough formulate "men's" or "women's" or "senior" formulas. So it is perfectly fine for females to take "men's" formulas or males to take "women's" formulas. The differences between them are mostly marketing.

- Try to choose probiotics with the least amount of added fillers (like lactose). But some probiotics come with prebiotic fibers added in, and we call these synbiotics. These are wonderful and you should preferentially buy these as long as you can tolerate FODMAPs alright. Synbiotics provide a little dose of the probiotics' preferred food source, complex carbohydrates that serve as prebiotic fiber; like going on a hike with your lunch packed for the long journey.

Example of GOOD brand:

from Garden of Life's Dr. Formulated line of probiotics (Once Daily)

Supplement Facts		
Serving Size: 1 Capsule Servings per Container: 30		
	Amount Per Serving	% Daily Value
Daily Probiotic Blend	115 mg	*
<i>Lactobacillus Acidophilus</i>		
<i>Lactobacillus Plantarum</i>		
<i>Lactobacillus Gasseri</i>		
<i>Lactobacillus Paracasei</i>		
<i>Lactobacillus Bulgaricus</i>		
<i>Lactobacillus Brevis</i>		
<i>Lactobacillus Casei</i>		
<i>Lactobacillus Rhamnosus</i>		
<i>Lactobacillus Salivarius</i>		
Total Lacto Cultures (20 Billion CFU)		
<i>Bifidobacterium Lactis</i>		
<i>Bifidobacterium Bifidum</i>		
<i>Bifidobacterium Breve</i>		
<i>Bifidobacterium Infantis</i>		
<i>Bifidobacterium Longum</i>		
Total Bifido Cultures (10 Billion CFU)		
Total Probiotic Cultures	30 billion CFU	
Organic Prebiotic Fiber Blend	410 mg	*
Organic Potato [resistant starch] (tuber), organic acacia fiber (<i>A. senegal</i>)		
*Daily value not established.		

Other Ingredients: Non-GMO Vegetable cellulose (capsule)

¹ At Expiration Date under recommended storage conditions. Store in a cool, dry place.

Example of BAD brand:

from TruBiotics One A Day - 1.5 billion CFUs

Nutrition Facts	
Serving Size : 1 Capsule	
Amount Per Serving	% Daily value*
Proprietary Blend 1500000000 Cells	
Lactobacillus Acidophilus LA-5 - Proprietary Blend 0 units	
Bifidobacterium Animalis BB-12 - Proprietary Blend 0 units	

Other ingredients: Anhydrous Sugar, Skim Milk, Hydroxypropyl Methylcellulose, Yeast Extract, Sodium Ascorbate, Less Than 2% of: Inositol, Magnesium Stearate, Sodium Glutamate, Titanium Dioxide

Label states that capsules are contained in TruPreserve, a canister designed to safeguard the live and active probiotics. To my knowledge a canister can do nothing to preserve potency.

There is no statement about potency guarantee.

Chelated zinc

Each of these minerals is usually absorbed from assimilation of animal proteins, but due to low stomach acid and our other digestive inadequacies, we may not be absorbing the iron and zinc we get from our food. In addition to working on improving mineral absorption, it is helpful to take supplemental forms of these as well. A chelated mineral is in a form that is similar to the way it naturally occurs in foods, bound to an amino acid so that it is stable enough that it doesn't bind to other minerals while moving through our digestive tract, and yet can pass into our cell membranes easily for utilization. Zinc is important for wound-healing, adequate sense of taste and smell, and the ability to fight infection. I've noticed that after several months of taking chelated zinc, my sense of smell has improved (it is almost

non-existent, so any improvement is much appreciated!). It is also crucial for the conversion of linoleic acid (omega-6) into GLA, and GLA into PGE1 (see the [Fats](#) section for more info) [1]. I take one 50 mg tablet of chelated zinc once a day. Be aware that taking mineral supplements like zinc and magnesium may reduce the absorption of certain oral antibiotics (e.g. minocycline) so don't take them at the same time. Make sure to read the info on your oral antibiotics that your pharmacist prints out for you. *** A note on iron supplementation: I had previously written that iron supplementation may be beneficial for CFers since, due to our malabsorption issues, we may be anemic or close to it (I am). However, a recent study I read suggests that iron actually feeds the growth of *Pseudomonas* in the lungs. CF lungs are unusually high in iron, especially in the lungs of people with the deltaF508 mutation, as a result of the faulty CFTR ion gradient. One in-vitro study discovered that supplementing the airway cells with iron increased *pseudo* growth and the proliferation of its biofilm, while using an iron-chelator (a compound that neutralizes the iron) reduced the formation of *pseudo* biofilms [14]. So, in conclusion, it may not be beneficial to supplement with iron after all as it is possible that we have a *pseudo* overgrowth in the guts as well as the lungs. No human studies have been done on this issue, so there is no evidence that says oral supplementation with iron is going to encourage growth of *pseudo* in the lungs, however I've decided to stay away from it just in case. This may be one reason why my acupuncturist found, upon testing my pulses, that my body did not like iron supplementation, even though I am technically anemic. I am also a double DF508.

Chelated Magnesium

Magnesium is a very important mineral that most Americans are deficient in because it is absorbed from vegetables (which few Americans eat enough of). Magnesium is critical for optimal absorption of calcium. Calcitonin is a hormone that increases calcium levels in the bones while preventing its deposition in the soft tissues. Magnesium stimulates the production of calcitonin, thus encouraging calcium to be stored in the bones and drawing it out of the soft tissues. Magnesium is also important for mental health and calm nerve function, relaxation of muscles and prevention of cramps, relief of constipation, and blood sugar regulation [1], plus over 300 enzymes need it, particularly for generation of ATP and the synthesis of DNA, RNA, and proteins [2]. High-chlorophyll plant foods are highest in magnesium, especially seaweeds, spirulina, and nuts and seeds. Magnesium is also high in chocolate, but due to chocolate's high oxalic acid content and the presence of the caffeine-like chemical theobrine, it's not recommended to eat it regularly. Eating it once in a while as unsweetened cocoa (added to a dessert or smoothie) won't hurt you though. I take one 133 mg pill of buffered chelated magnesium once per day when not on minocycline. Plus I add spirulina to all of my smoothies, and sometimes cocoa powder too. Chris Kresser recommends a 400-600 mg supplemental dose per day (I should probably up my dose since my blood work shows a magnesium deficiency).

Vitamin D3

Vitamin D is critical for absorption of calcium and preventing infection, particularly viral infection. Vitamin D is obtained in two ways. The first is through conversion of cholesterol to vit. D3 via sunlight absorbed by the skin. This is why northern peoples evolved to become fair-skinned - the less skin pigment there is, the more sunlight is absorbed (less

sunlight in northern places) and the more efficient the conversion of cholesterol to vit. D3. The second way is through food, primarily seafood and animal fats. The best supplemental form of vitamin D is cod liver oil and has the best absorption rate. But straight vit. D3 capsules can also be taken, although its absorption rate is lower. It's recommended to take 2,000 - 5,000 IU of vit. D3 per day [2]. CFers are generally deficient in vit. D, since it is a fat soluble vitamin, so the more the better. I take a 5,000 IU capsule once a day. Take with a fatty meal and enzymes. Also make sure you get enough cholesterol in your diet, since cholesterol is converted to vit. D naturally in your body. Don't follow the latest fashion and be tricked into believing dietary cholesterol is bad for you. There is a significant and mounting body of medical research pointing to the fact that dietary cholesterol has nothing to do with heart disease and is absolutely critical to tissue formation (particularly in the brain) and healing. Chris Kresser and many others including Dr. Natasha Campbell-McBride have much more to say about this.

Betaine HCL

I used to take a daily dose of HCL with my highest protein meal of the day, before I started using bitters with every meal. See [this blog post](#) for more details.

Sources:

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IX. Herbs for CF and Beyond

Every case of CF is different, so not every herb that I list here is going to be helpful for everyone with CF. What herbs to take depends on what symptoms you have and your energetic constitution. If possible, contact a local herbalist (especially those that are American Herbalist Guild registered) or naturopath to discuss what herbs may be right for you. Here is a short list of herbs that may be helpful for some people with CF in certain situations. By the way, the doses I mention here are for the "average" adult, so children should take smaller doses in proportion to their weight. Doses are always tailored to each individual's needs. Remember to always inform your doctor of what herbs you're taking and to discuss your use of herbal supplements with a qualified expert in herbal medicine, especially if you are taking prescribed pharmaceuticals. If you have any additional questions about these herbs or others, please contact me. I go to school for this stuff, and I love talking about it!

Turmeric Extract/ Curcuminoid Complex + Genistein

Turmeric (*Curcuma longa*) is a root used in Indian cooking and Ayurvedic medicine. It is a potent anti-inflammatory, and it has another magical property: it can partially correct the faulty CFTR channel in CF! Curcumin, a compound contained in turmeric, facilitates better functioning of the sodium/chloride ion gradient across the cell membrane (problems with this ion gradient are at the root of the pathology of CF). Curcumin can cause a change to the shape of the CFTR in deltaF508 and the G551D mutations in cell models [1]. However, in human models (that is, us) turmeric alone does not provide significant clinically observed benefit, besides mildly reducing overall inflammation in the body. But when combined with genistein, a constituent of soy, the combination can be a more potent corrector/potentiator of the CFTR, facilitating observable (and often significant) clinical benefit. For more information on the curcumin + genistein combo, read [this article](#). Curcumin also helps reduce allergic airway inflammation, which is characteristic of asthma [2]. Multiple human trials have shown its safety at very high doses, up to 8,000 mg per day [3], but for we will need less than that for our uses in CF. Intestinal absorption is very low unless accompanied by black pepper and a fatty meal. So buy curcumin capsules that include black pepper in their formulation, and eat them with a fatty meal or snack.

Garlic

I've written a bit about garlic [here](#) already, but I want to reiterate how powerful this plant is in so many ways, especially for respiratory infections. Garlic has strong antiviral, antifungal, and antibacterial properties when crushed and eaten raw [4]. This is largely due to the antimicrobial powers of the constituent allicin in garlic. Its constituents enter the blood stream via the gut and volatilize when they circulate through the lungs, causing "garlic breath". Thus, our goal when using garlic medicinally is to eat enough to induce "garlic breath" because that means that means its antimicrobial constituents are having direct effects within the lungs themselves. During colds, flus, or acute lung infections, one

can eat up to a bulb of garlic a day. Dose depends on how well your stomach can tolerate the pungency, and how much you're willing to piss off your loved ones with the smell! Just make them eat garlic too and they won't notice the smell as much. You can mix raw garlic in raw honey to make it more palatable, or drink it in a fire cider preparation. In order to potentiate the allicin you must crush the cloves and let them sit for 5-10 minutes before eating, chopping, or cooking with them. When I'm feeling sick with a cold, I usually chop up 2 cloves of garlic at a time and swallow the pieces with water like pills. I do this 3-5 times a day until symptoms resolve.

Baikal Skullcap

Baikal skullcap (*Scutellaria baicalensis*) is an herb now commonly used in Western herbalism but comes from the Materia Medica of Chinese Medicine. Its root contains bitter and cooling iridoids, such as catapol, and flavonoids such as baicalin, scutellarin, and wogonin [5]. Its flavonoids are epigenetic regulators and reduce inflammation by shutting off prostaglandin formation and nuclear factor kappa-B [6]. Baikal skullcap shares a significant amount of chemistry with *Scutellaria lateriflora* or American skullcap, which we use commonly in Western herbalism as a nervine and anxiolytic. Baikal skullcap, on the other hand, is mainly used as a strong anti-inflammatory. It is used in inflammatory diseases such as cardiovascular disease, liver disease, autoimmunity of all types, and cancer. It is also helpful for those of us with runaway inflammation due to chronic infection. I have used it successfully in combination with andrographis to cool my chronic fevers associated with my lung infections. This is a very cold plant, so for people who tend to run cold it may not be the best option. I use 2mL of tincture 2x/day of this plant, but dose should be tailored to one's needs.

Andrographis

Andrographis paniculata is a traditional Ayurvedic herb that is becoming more commonly used in the West these days for boosting immunity, as an antimicrobial (antibacterial, antifungal, antiviral), and as a strong anti-inflammatory [7]. It is credited for stopping the spread of the 1919 flu epidemic in India, and is thought to be an equally or more powerful immune-stimulant than echinacea. The incredible thing about andrographis is that it is powerfully anti-inflammatory and cooling at the same time as being immune stimulating, which is ideal in situations where infections are causing significant inflammation. Thus, it's my belief that andrographis can be a powerful ally for CFers, especially adults with high inflammatory burdens. Like baikal skullcap, it is a very cold herb, and thus may not be best for those who tend to run cold. It is also very bitter (but I've grown to like the flavor) and so may be hard to tolerate for some (you may be able to find it in capsules). There is a supplement called Kold Kare that is simply tablets of andrographis, and these are wonderful but very expensive, so tincture form may be best if there is a need to use it long term. I take 2 mL of tincture 2x/day (mixed with baikal skullcap, above). It can also be taken in larger doses when you're fighting a virus or acute infection. For me, taking this baikal-andrographis combo is critical for keeping my inflammation in check and preventing

evening fevers (caused by my MRSA infection). I notice when I miss a dose. If either andrographis or baikal make you feel too cold or make your stools looser, reduce the dose.

Reishi

Reishi (*Ganoderma lucidum* or *G. tsugae* or ling-zi) is an immunomodulating mushroom that cuts down on histamine-mediated immune responses, calming allergic or asthmatic symptoms. It does this by interacting with the lymphatic tissue in the gut, educating T cells to shift their responses from Th2 (humoral and antibody-mediated) to Th1 (cellular, more responsive to single-celled infections like bacteria) immunity [8]. Reishi is slightly cooling and has an affinity for the lungs, so it is ideal for situations where inflammation of the lung is causing issues (CF, asthma, etc.), while it strengthens the body's ability to fight infection. It is also used for autoimmune diseases and allergies in general, and is effective against cancer (so are many other medicinal mushrooms including turkey tail, chaga, and maitake). Dried reishi mushroom can be decocted (simmered over many hours, usually >4 hours) and drunk throughout the day, or taken in a double-extraction tincture like [this one](#). The dose for the double extraction is 1-2mL twice a day, with higher doses used in cancer or more severe allergies, autoimmunity, or inflammation.

Usnea

Lichen is a symbiotic relationship between algae and fungi. *Usnea* is a genus of multiple species of lichen that have both strong anti-microbial and immunomodulant properties. Usnic acid, produced by its algal overcoat, provides it antimicrobial powers [9], while the fungal polysaccharides that make up its stringy core stimulate the immune system to mount a stronger and more effective response. Usnea grows wild in many places around the world, including in the woods in my backyard, so I go out and harvest it myself (with respect for sustainability and regeneration of the species). It grows on branches and fallen twigs in mixed deciduous/conifer forests. It's best to harvest what has fallen to the ground. You can make a tincture out of it or just eat it raw. But cut off any brown or dead parts that you may see, wipe off any dirt, and separate it from other species of lichen that may be growing alongside it. I eat it raw and roll it into a little pill-sized ball, chew it then swallow. It's a bit bitter and spicy when fresh. It's a common home remedy around here to eat it during a cold or flu. Here's a little more info on this [lovely lichen](#). You can also dry the lichen, separate the algal overcoat from the fungal core, powder the algae, and use it as an antiseptic powder to sprinkle on wounds. The dose for eating raw usnea is a little jelly-bean sized ball, eaten 2-3 times per day.

Cinnamon

Cinnamon (*Cinnamomum verum*) is used in traditional medical systems to treat diabetes, stabilize blood sugars, and warm the body. It is a warming diaphoretic herb that can help bring the body temperature up during a low-grade fever to help the immune system kill

pathogens. But the main use of cinnamon these days is to control blood sugar. It has multiple mechanisms of action including inhibiting polysacchride-cleaving enzymes, increasing insulin sensitivity, and providing mucilage to slow down food's transit in the GI tract which reduced blood sugar spikes [10]. Cinnamon acts as an alpha-glucosidase inhibitor. Cinnamon is an important tool for those of us who have blood sugar irregularities, or have CFRD. It can be used on its own or in conjunction with insulin (if you have CFRD). It is an ideal herb to use for those who have been diagnosed with glucose intolerance, but are not yet diabetic. Cinnamon can be added to carbs, or you can take it in tablets or capsules. I used to buy tablets of cinnamon extract from Vitacost, but I've found it to be more effective to just buy gelatin capsules and fill them with cinnamon powder myself. I take at least 1.5 grams of cinnamon powder (three "00" - sized capsules) with a carb-heavy meal, alongside my insulin.

Digestive Bitters

For hundreds of years people have taken "bitters" (tinctures of bitter herbs) before meals to help prepare the digestive system for complete assimilation of foods and to prevent GI discomfort and indigestion. The bitter taste triggers the central nervous system to release the necessary elements for proper digestion, including bile from the gallbladder, pancreatic enzymes, hydrochloric acid in the stomach, pepsin (an enzyme released in the stomach that breaks down protein), and gastrin [11]. These herbs include dandelion, burdock, gentian, motherwort, wormwood, angelica, artichoke leaf, yellow dock, and many more. Put half to one dropperful of the tincture onto the tongue (you must *taste* it in order for it to work) 5-15 minutes before eating, especially before fatty foods. I believe that bitters are one of the *most critically important* medicines a CFer must use (in addition to pancreatic enzymes) in order to digest properly. I carry my bitters with me everywhere. When used regularly they will correct and prevent reflux/heart burn (and can also be used after meals for post-meal reflux), gas, bloating, and indigestion of all sorts. You can make a tincture of bitters yourself (dig up some dandelion roots yourself, dry them, stick them in some organic vodka, steep for a month, strain, and voila!) or buy them from a natural food store or [online](#). You can get the same effect by eating a salad of bitter greens (like arugula or dandelion greens) before meals, or even something sour and pickled, like sauerkraut or kimchi.

Elecampane

Elecampane (*Inula helenium*) is a root used specifically for clearing up respiratory infections. It is antimicrobial (with activity against *Mycobacterium tuberculosis* [12]), an expectorant, and an immune stimulant. It kills pathogens and helps to move mucus out of the bronchial passages by stimulating cilia movement (little hairs in the respiratory system that pulsate to move things upward and out) and by thinning mucus slightly. It is one of the strongest herbal stimulators of the muco-ciliary escalator, and can help regrow cilia when they are damaged. Furthermore, it is a warming digestive bitter and contains inulin, an important pre-biotic fiber that can help restore healthy gut flora. It is also an immune stimulant, increasing the number of T cells. Is this herb perfect for CF or what?! A normal

dose of tincture is 1-2 mL 3-4xday, but I was advised that during acute exacerbations or infections, 1-5mL 4-5xday may be a more appropriate dose.

Thyme

Thyme (*Thymus vulgaris*) is a highly antimicrobial herb that contains strong essential oils such as thymol, carvacrol, and linalool, among others. It is especially helpful against lung infections, colds and flus, sinus infections, as well as infections of the throat, mouth, and GI tract. Its essential oils have shown to be very effective at killing viruses, fungi, gram-negative and gram-positive bacteria, including MRSA and other antibiotic-resistant bacteria [13]. When experiencing respiratory exacerbations, or when you have a cold or flu, the dose in tea is 1 tsp of thyme leaves (fresh or dry) per cup of hot water (covered and steeped for 10-15 minutes) 3xday. It is a good idea to include a bit of rosemary in the tea as well, which acts as a bacterial efflux-pump inhibitor, making antibiotics more effect at killing bacteria [14]. You can also take a tincture of it (best in a formula with other herbs, since it's so intense) with a dose of 2-5mL 4-5xday. Taking small doses more frequently is most appropriate during an acute illness. It may also be a helpful herb when trying to correct gut dysbiosis, as part of a larger protocol.

Milk Thistle

Milk thistle (*Silybum marianum*) is one of the more well-known and popularly-used herbs in the West, and for good reason. It is a powerful protector of the liver and can be helpful in treating and preventing all kinds of liver issues, from mild to acute. In fact, in Europe the primary constituent of milk thistle, silymarin, is used as a pharmaceutical drug for rescuing people from acute toxic liver failure (drug name is Legalon SIL) [15]. Milk thistle is extremely safe, even at high doses, and can be useful in helping those with chronic exposure to possibly hepatotoxic drugs and environmental exposures (i.e. CFers) prevent or reverse liver damage. Milk thistle works by stimulating the liver to produce its own endogenous glutathione, the body's primary antioxidant, which can rescue the liver from oxidative damage caused by toxins or infections. It also upregulates phase II detoxification and acts as a direct antioxidant in the liver. I take milk thistle everyday since I am constantly exposed to drugs that are hard on my liver, and I increase the dose when I am in the hospital. The best form to take it is in pill form, with a standardized extract of about 80% silymarin. The effective dose is 300-500mg 2-3xday for maintenance, or about 1 gram 2-3xday for serious liver issues (liver cancer, advanced cirrhosis, etc.). There is no known harmful or toxic dose, so it's safe to take a lot.

Adaptogens

Adaptogens are a class of herbs that help the body become more resilient to physical and emotional stress [16]. They do this in large part by regulating cortisol levels. Every adaptogen works a little bit differently and each has its own energetic profile, so it is important to consult an herbalist when choosing which adaptogen is right for you. I believe

that adaptogens are an important part of a CF herbal protocol because of the extensive amount of stress (both physical and emotional) that we endure on a daily basis. Using adaptogens over the long term helps the adrenal glands stay healthy and prevents HPA axis dysregulation and adrenal fatigue/collapse. There are many adaptogens that have been used throughout the centuries in pretty much every part of the world to improve physical/athletic performance, mental clarity, and recovery from illness. These include: ashwagandha, American ginseng, Korean ginseng, eleutherococcus ("Siberian ginseng"), rhodiola, schisandra, licorice, shatavari, and others. Talk to an herbalist about which one may be best for you.

Others

There are many, many more herbs out there that can be helpful for CF, many of which I will discuss in my upcoming online classes.

Sources:

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X. Holistic Healing Modalities

Modern Western technomedicine is only one of thousands of medical systems in existence, so let us not be tricked into believing that there is nothing outside of your CF doctor's office that may be helpful to you. While modern medicine has some extremely valuable tools, especially in regards to emergency medicine and surgery, it is a very young system and some practitioners can be arrogant, often trying to convince their patients that other medical systems are just a bunch of hocus pocus. This is a false belief and politically motivated, as many alternative healing systems have been used for thousands of years very successfully, and are still in use today in places where modern medicine has not achieved hegemonic control. Thus I advocate for integrative medicine: using the tools of modern medicine when appropriate and alternative modalities when appropriate.

Acupuncture/ Traditional Chinese Medicine

I have been using acupuncture since high school, and I very much appreciate the holistic, systems-based approach that Traditional Chinese medicine employs. A good acupuncturist is also well-educated in the other healing modalities of Chinese medicine, including herbs, nutrition, and non-needle therapies such as cupping, massage, aromatherapy, and acupressure. A particularly good acupuncturist is so adept at reading the pulses that she can help you test for food sensitivities simply by having you hold a particular food. But in general, acupuncture is fantastic at relaxing muscle tension and unblocking stagnant energy, which can manifest in the CF body in a number of ways including mucus plugging, constipation, or a dysfunctional liver or gallbladder. The point of acupuncture is to help the body rebalance its yin and yang energies so that there is no stagnation. Regular treatment with acupuncture is best.

Massage

It would make a hell of a lot of sense if insurance companies would cover massage therapy for certain diseases (ours included), don't you think? With all the coughing we do, it is really hard to avoid developing back spasms, rock-hard knots in the shoulders, a locked-down diaphragm, or super-tight muscles between the ribs. Boy oh boy, if I could get a massage every week, I'm sure I would be able to breath deeper and more expansively! If you can afford to get a massage often, please do! Working on loosening up those tight muscles in the chest around the rib cage, the pectorals, the shoulders, the diaphragm, and the entire back will really help you become able to expand your lungs and breath deeper, getting more oxygen and moving out more mucus. If you can't afford a massage very often, coerce a friend or significant other help you out - it doesn't have to be professional to feel good!

Naturopathy and Osteopathy

Although two different disciplines, both naturopathy and osteopathy are non-conventional Western medical systems that are really great in that they understand the body as functioning more like a living, interconnected system, *not* as a machine with isolated parts.

I love visiting my naturopath or osteopath because he/she/they will present me with a totally different take on an issue than my CF docs would, and help me think more expansively while relating all of my health concerns to one another, forming a more coherent, interdependent vision of my body and how it works. Naturopathy in general focuses on natural treatments for health issues. Instead of reaching immediately for pharmaceuticals, naturopaths discuss diet options, herbal and supplemental treatments, and can even use certain tools that technomedicine doctors use (like supplemental hormones) in a more holistic and biologically-appropriate way. Some naturopaths may practice functional medicine, which essentially is the understanding of the body as a whole system where every facet of your body is connected to every other facet. A good naturopath can have a much deeper and more accurate understanding of the way the body actually works in all of its many interconnected organ systems than a regular MD, and can modify a therapy so that it is very specific to a patient's needs, not just a one-size-fits-all dose that technomedicine docs usually use. A naturopathic doctor has the initials N.D. (Naturopathic Doctor) after her name and takes the title Dr.

Osteopathy is a medical system that understands the body as a living, dynamic system made up of many interconnected subsystems. In a way, osteopathy is the application of systems theory to the human body. In the US, osteopaths go to a medical school very much like regular MDs, and so have a very strong medical science background. However, osteopaths attempt to treat health issues very differently than MDs in that osteopaths try to understand the *cause* of the issue and to correct it naturally, while MDs usually just prescribe drugs to mask symptoms. Osteopaths also can do somatic physical manipulations, kind of like a physical therapist, to help the body heal itself. In the US, osteopaths are essentially full doctors that just specialize in osteopathy, so can order labs and even prescribe medications. An American osteopath has the letters D.O. (Doctor of Osteopathic Medicine) after his name and takes the title Dr.

I believe that it would be very beneficial to have as one's primary care physician a naturopath or osteopath instead of an MD. In Vermont, this is allowed and insurance companies are required to cover visits to both naturopaths and osteopaths.

Herbalism

Using herbs and plants to help treat illness and maintain health has been done since before we became *Homo sapiens*. Literally. We've been eating herbs to heal ourselves forever, and every traditional culture on earth has used numerous local plants to make medicinal teas, tinctures, poultices, as essential oils, and in cooking. According to my teacher Guido Mase, we evolved with herbs as a staple of our diet, and a diet lacking in herbs can be as dangerously unhealthy as a diet lacking in any other essential macronutrient, like protein or fat. It's no wonder so many Americans are unhealthy, nobody takes herbs anymore! So let's fix that - eat more herbs! This can include the more "medicinal" kind that can be prescribed by an herbalist, like goldenseal, red reishi mushroom, or lobelia, or it can include more well-known culinary herbs like peppermint, licorice, basil, or black pepper. There are thousands and thousands of herbs that have innumerable health benefits. Some herbs are more mild and can be used liberally, like peppermint. Other herbs are extremely potent and should only be used under the guidance of an experienced herbalist. In general

most herbs are pretty safe if not taken in large doses, however it is always best to consult an herbalist to determine which is the right herb to treat a particular ailment, and what the form and dose should be. There is not an herbalist license in the US, however there is a professional guild that has a number of qualifying criteria that if met, a practitioner can become a Registered Herbalist (R.H.). A good herbalist should have a solid foundation in human physiology and pathology, botany, as well as an in-depth understanding of any given herb's characteristics and applications through the lens of Western Herbalism, Ayurveda, and Chinese Medicine.

I am a clinical herbalist with six years experience assisting people with CF optimize their health. If you're interested in my consultation services, please sign up [here](#).

I will be creating online classes going into more depth of all of the topics I discuss in this eBook, so please check in [here](#) for more information.