

---

# Food As Medicine

*A guide to using food as medicine through  
the scope of Functional Medicine*

DR. HYMAN

---

When people ask me, what is functional medicine? I say it is the science of creating health.

Instead, what most of us experience today is conventional medicine, which focuses on diagnosis and treatment. It is what I, and all other doctors in practice today, learned in medical school. The goal in modern medicine or conventional medicine is to diagnose illnesses based on symptoms and geography. If you check enough boxes of the right symptoms, you get a diagnosis.

For example, if you have pain and inflammation in certain joints and abnormal lab tests, you receive the diagnosis Rheumatoid arthritis (RA). That's the end of thinking in conventional or modern medicine. You name the disease and then are told that Rheumatoid arthritis is causing your joint pain. It is not the cause, but simply the name. The causes could be many. In fact, anything that causes inflammation could trigger RA — Lyme disease, gluten, leaky gut, or mercury toxicity.

Naming the disease tells you nothing about the cause. **We call it the naming and blaming game.** Then most doctors treat the downstream symptoms instead of the upstream causes. Since RA is an inflammatory disease, patients are given powerful drugs, including steroids, chemotherapy drugs, and powerful immune suppressants called biologics that shut off inflammation, all with terrible side effects.

## **Wouldn't a better approach be to find the cause and remove that?**

Don't get me wrong, conventional medicine is absolutely necessary in the face of emergencies and life threatening illness, but what is missing is the science of prevention and creating optimal health. What is missing is the fundamental understanding that our body is an interconnected system and that all of our daily inputs (food, exercise, joy, etc.) influence our health status.

The best example of a discovery that completely disrupts our old notion of disease is the microbiome, which wasn't even discussed or named as a thing in medicine twenty years ago. The microbiome breaks the old idea of single cause, single disease, single drug model. Changes in our microbiome have been linked to cancer, heart disease, obesity, diabetes, autism, depression, dementia, asthma, fibromyalgia, autoimmune disease, allergies, skin disorders, and much more.

We need a different model to explain these discoveries. Just as Einstein turned physics upside and challenged Newton's paradigm, so too functional medicine overturns our outdated understanding of biology, human health, and disease.

Functional medicine focuses on the root cause. The approach to restoring health is simple. Take out the bad stuff. Add the good stuff. The body's natural intelligence and healing mechanisms do the rest. We start with removing the cause (or causes) and then replace what the body needs to thrive. There are only a few causes that result in almost all diseases.. They include toxins, allergens, microbes, poor diet, and stress.

---

These triggers of disease interact with your genes and all your basic biological networks. In addition to these triggers, there are necessary ingredients for health – real food, nutrients, hormones, light, water, air, rest, rhythm, sleep, movement, love, connection, meaning, and purpose.

Disease occurs when you have too many triggers and not enough of the right ingredients. Creating health is simply a matter of identifying and removing the triggers and replacing the necessary ingredients for health.

My goal is to spread this message far and wide so that preventative medicine becomes the norm, and we live in a society that is thriving rather than crippling under the epidemic of chronic disease.

---

# 7 Systems of Functional Medicine

In functional medicine we recognize that the body is not organized by medical specialties, despite our medical training. These specialties are simply the branches and leaves on the tree of disease. What drives all disease imbalances is the fundamental networks underlying all disease — networks that are all dynamically interacting every moment with your lifestyle, disease triggers and genes.

Nearly every one of the 155,000 diseases listed in the disease classification system known as ICD-10 are caused by imbalances in seven interconnected systems. Fix those systems, and in most cases, you don't have to treat the actual disease.

## What are those systems?

1. Assimilation (digestion, absorption, microbiome, digestive system, respiration)
2. Defense & Repair (immune, inflammation, infections, microbiota)
3. Energy (energy regulation, mitochondrial function)
4. Biotransformation & Elimination (toxicity, detoxification)
5. Transport (cardiovascular, lymphatic system)
6. Communication (endocrine, neurotransmitters, immune messengers)
7. Structural integrity (from subcellular membranes to musculoskeletal structure)

Functional medicine allows us to connect the dots. Common links between many seemingly separate diseases are now clear. What do Alzheimer's, autism, cancer, diabetes, depression, autoimmune disease, heart disease and obesity have in common? Inflammation, oxidative stress, imbalances in the microbiome, and often toxic overload and imbalances in cell messengers. Rather than treating all these diseases as distinct entities, the focus is on uncovering the root causes for each person. Ten kids with autism, or ten patients with rheumatoid arthritis, or ten patients with heart disease may each have different causes and need different treatments. Today it is one size fits all treatment. Once you get a diagnosis the thinking stops and you simply apply the recipe of pills of the day to treat this or that disease. For most chronic diseases, the results are dismal, or come with serious side effects. By focusing on restoring balance in the basic biological networks of our body, diseases often improve or resolve.

While all of the triggers of disease noted above (toxins, allergens, microbes, poor diet and stress), and all the ingredients for health (nutrients, hormones, air, water, light, rest, rhythm, movement, sleep, love, connection, meaning and purpose) impact these networks to create balance or imbalance, by far the biggest regulator of all these networks is food.

---

Food is the biggest lever to impact all these systems. The wrong food harms each system and the right food helps optimize each system. The right food regulates the health of your microbiome, your immune system and reduces levels of inflammation and oxidative stress and improves your energy systems. Food balances your hormones and brain chemistry, supports detoxification and improves the function and health of our circulatory and lymphatic systems, and it even provides the raw materials for every cell, muscle, tissue, organ, and bone in your body.

While most doctors have not seen the power of food, mostly because they were not trained in how to use food as medicine, I have seen miracles over decades. And so have thousands of functional medicine colleagues. Except they are not miracles. They are the result of applying the latest advances in understanding how our bodies actually work, not how we were trained in medical school. Autoimmune diseases disappear, depression vanishes, migraines evaporate, psoriasis and eczema clear up, Alzheimer's patients improve their memory, type 2 diabetes gone in a few weeks. These are not anomalies or spontaneous remissions, but reproducible results based on applying food as medicine with the model of functional medicine.

There is no other activity you do every day that has more power to change our biology than what you eat. You literally ingest pounds of foreign material into your body daily. If all calories were the same, it would not matter what you eat, but this is not the case. Food carries information molecules, instructions, and code that programs your biology with every bite for better or worse. Industrial food drives inflammation, oxidative stress, imbalances in hormone and brain chemistry, damages your microbiome, changes your gene expression to turn on disease causing genes. Real whole nutrient and phytonutrient rich food does the opposite.

If you need a sign to upgrade the quality and nutrient density of your food, this is it.

---

# The Gut and Food Connection

In medical school, I learned at least a dozen different ways to help people poop, and none of them (except for Metamucil, somewhat) had anything to do with food.

Years ago, I had a conversation with a gastroenterologist about the role of food in digestive problems. I suggested that since we eat pounds of stuff every day which travels through every inch of the 30(+) foot tube that is the digestive system, would it be possible that what we eat could impact irritable bowel, reflux or inflammatory bowel diseases? He thought the idea was intriguing. Back then, there wasn't even a word for the microbiome.

Turns out the microbiome, the magical kingdom of microbes living in you, may be the most important organ in your body. Bacteria in your microbiome outnumber your own cells 10 to 1, and bacterial genes outnumber your own genes 100 to 1.

An unhealthy microbiome can lead to heart disease, cancer, diabetes, obesity, autoimmunity, dementia, allergies, asthma, fibromyalgia, Parkinson's, skin disorders like acne, asthma, eczema and psoriasis, not to mention all the digestive disorders including irritable bowel, reflux or colitis. A healthy gut microbiome can help heal those conditions. The key is learning to tend to your inner garden.

## Is your food medicine or poison?

Bad gut bugs grow for two reasons: not eating enough of the foods that feed the good guys and eating too many gut busting foods. The biggest culprit is gluten. Modern wheat has powerful inflammatory proteins called gliadin that create a leaky gut. Most wheat today is sprayed with the weed killer, glyphosate, at harvest to dry it out. Your morning Cheerios has more glyphosate than vitamin B12 and vitamin D which are actually added to the cereal. Why is that bad? Aside from being a known carcinogen, glyphosate destroys your microbiome.

Other common gut busting foods include sugar and starch. The bad guys love it just like you do. It promotes overgrowth of toxic bacteria and yeast, and it's the reason for getting a "food baby" after a meal. Refined oils, which make up about 10 percent of our calories, also lead to leaky gut and trigger something called metabolic endotoxemia. In other words our metabolism is poisoned because of toxic byproducts of bad bacteria, leading to obesity and type 2 diabetes. Omega 3 fats do the opposite.

In addition to bad fats, we over consume additives and preservatives. Some of the worst are the thickeners and emulsifiers in most processed food including carrageenan and gums. They cause leaky gut and lead to autoimmune disease.

These are just a few examples of common gut disruptors in the SAD diet. Now, let's talk about good gut food.

---

## Gut Healing Foods

We know that the right gut bugs and the right food help keep your gut barrier lining intact while the wrong bugs and foods break it down.

How do you feed the good bugs? They munch down on the fibers in our food. These are called pre-biotics. Certain foods have high levels including, artichokes, asparagus, Jerusalem artichokes, plantains, seaweed and more. Any fiber rich foods help keep the garden healthy. This means vegetables, fruits, nuts, seeds, whole grains, and beans.

Probiotics rich foods also help support a healthy gut. My favorites are traditional fermented foods such as sauerkraut, pickles, tempeh, miso, natto and kimchi. Polish women eat 30 pounds of sauerkraut a year in Poland. When they move to the United States they stop eating it. Polish women in the US have dramatically higher rates of breast cancer than their cousins in Poland chowing down the kraut.

Some of the exciting discoveries around the microbiome involve the role of polyphenols, the colorful phytonutrients found in plants. The good critters love them, feed on them and in turn, those bugs protect us. For example, one such bug, Akkermansia, loves cranberry, pomegranate and green tea. When it is in abundance, it creates a protective layer in the gut preventing a leaky gut, autoimmune disease, and even heart disease and diabetes. Turns out this bug is also necessary for certain cancer treatments to work, such as immunotherapy.

Your gut also needs other nutrients to function well. Zinc from pumpkin seeds and oysters is necessary for digestive enzyme function. Omega 3 fats from fish such as sardines or herring are needed to regulate inflammation and heal a leaky gut. Vitamin A from beef liver, cod liver, salmon and goat cheese also is necessary for gut healing. Foods with collagen such as bone broth, containing glycosaminoglycans, also help heal the gut.

Food is the most important regulator of your microbiome. Remember next time you take a bite that you are not just eating for your own health, but the health of your inner garden. How many of these gut healing foods will you incorporate?

---

# The Immunity, Inflammation, and Food Connection

What do nearly all modern diseases have in common? Inflammation.

Depression, cancer, heart disease, obesity, diabetes, dementia, allergies, asthma, chronic fatigue, autoimmune disease, and more are all inflammatory diseases.

That begs the question, what is causing all this rampant inflammation? It's mostly our food—too many inflammatory foods and not enough anti-inflammatory foods. Our immune system attempts to keep a perfect balance, always on surveillance for danger. A little bit of immune activation is good; a lot, not so much.

Obesity and chronic disease are inflammatory states, predominantly caused by our modern diet. While there are other causes of inflammation, such as toxins, allergens, infections, and stress, food plays the greatest role for most of us.

High levels of sugar and starch are the main drivers of inflammation. Sugar and starch spike blood sugar, which in turn spikes insulin. Insulin triggers a cascade of harm. It drives sugar and starch to be stored in fat cells called adipocytes in your belly and around your organs. This is not just any fat; it is a super fat that causes metabolic and hormonal chaos. It also produces tons of inflammation – what are called adipocytokines. As we ingest more and more sugar and starch (the main calories in our modern diet), we need more and more insulin to overcome the resistance to its effect, much like an alcoholic needs more and more alcohol to get drunk. More insulin, more fat storage, more inflammation. While sugar drives inflammation, it also suppresses your immune response to infections and fuels bad bugs, resulting in leaky gut and more inflammation.

Fats may be another trigger of inflammation. While still debated in science, the sheer volume of processed food has increased our intake of refined oils that contain lots of omega 6 fats. As hunter gatherers we consumed our omega 6 fats from nuts and seeds and other plants, not from gallons of industrially produced, solvent extracted, heat-treated oxidized oils. We have also eliminated most foods containing omega 3 fats. The balance is key. Too many omega 6 fats can inhibit the anti-inflammatory effects of omega 3 fats, resulting in inflammation.

My recommendation is to get your omega 6 fats from whole foods such as nuts and seeds or unrefined plant oils. And make sure you get enough omega 3 fats from small wild fish. Population studies show that people who get their omega 6 fats from whole foods do better overall.

The other main trigger of inflammation in our diet are food sensitivities, which fuel low-grade, chronic inflammation. How does this happen? We live a gut-busting life, eat a gut-busting diet, and the result is leaky gut. What happens when all those food proteins leak across the gut lining and encounter your immune system? Your body attacks by producing an immune response.



---

The most common foods that create reactions are gluten, dairy, grains, beans, soy, eggs, nuts and seeds, and nightshades. Often healing the gut will reduce or eliminate reactions. This is why an elimination diet is such a powerful tool for anyone with any inflammatory condition.

## **Use the Power of Anti-inflammatory Foods**

While there are many ways food can trigger inflammation, food is also the most powerful source of anti-inflammatory compounds. Many of those 25,000 + phytochemicals are powerful anti-inflammatories. The polyphenols in plant foods are among nature's best inflammation-fighting compounds. Where is the best place to find these compounds? At the end of the rainbow — a rainbow of bright pigments and colors found in plant foods, red, green, yellow, orange, purple. Extra virgin olive oil contains oleocanthal, for example, which activates the same anti-inflammatory receptors as ibuprofen without all the side effects.

Spices are anti-inflammatory powerhouses, including turmeric, ginger, and rosemary. Meat cooked with spices neutralizes potential inflammation. Omega 3 fats found in wild foods, fish, seafood, and some nuts and seeds are also powerful anti-inflammatories.

Mushrooms including Shitake, Maitake, Reishi, Chaga, Turkey tail, and Cordyceps contain powerful immune regulating and anti-cancer compounds called polysaccharides. And foods rich in vitamins and minerals boost immunity and reduce inflammation, including vitamin C, zinc, selenium, and vitamin D. Vitamin D alone regulates hundreds of genes that affect inflammation and immunity. So a meal of guavas and parsley (vitamin C), pumpkin seeds and oysters (zinc), Brazil nuts and sardines (selenium), and porcini mushrooms and herring (vitamin D) is an immune-boosting, anti-inflammatory super meal. Not sure what you could make with all those ingredients, but you get the idea!

The best thing you can do for your health is to cut down or cut out inflammatory foods and increase anti-inflammatory foods starting today.

---

# The Food and Energy Connection

Most of us understand that food provides energy, but how it provides energy is a mystery.

Here's a rundown of how it works. The food you eat breaks down into fats, protein, and carbohydrates, each which contain different nutrients that your body uses to create energy. The oxygen you breathe combines with these nutrients in these tiny little factories inside your cells called mitochondria. The food and oxygen then produce the form of energy used by our bodies called ATP. It powers everything. Once we stop producing energy we die.

Some foods burn clean, and others create a lot of exhaust that damages our tissues and cells, producing free radicals that cause oxidation (like rusting) and inflammation. Our body produces its own antioxidants to protect us from this damage, but often our body's antioxidant systems can't keep up when we eat too much sugar, starch, processed foods, and too few nutrients.

The key to longevity and health is optimizing your mitochondria. Poorly functioning mitochondria are found in most chronic diseases including obesity, diabetes, heart disease, dementia, Parkinson's, chronic fatigue, and fibromyalgia. It might also show up as fatigue, brain fog, muscle pain, intolerance to exercise, and rapid aging.

How we feed our bodies affects the number and function of our mitochondria. While environmental toxins, infections, food allergens, an unhealthy gut microbiome, nutrient deficiencies can all damage mitochondria, the biggest factor is food.

One day while taking a walk at a longevity conference with Leonard Guarente, the researcher from MIT who discovered sirtuins (regulatory genes that affect aging), I asked what had the biggest impact on these key regulatory genes. His answer surprised me at the time. Sugar and refined starches.

Americans eat nearly a pound of sugar and flour a day, which may partly explain why life expectancy is going down for the first time in history. The other problem is just too much food. We never give our engines a rest. Snacking, late night eating, and bingeing are American pastimes.

Since 1961, the average American consumes an extra 720 calories a day, calories that have to be stored or burned, overwhelming our poor little energy factories and producing more waste or free radicals than our bodies can handle. During the same time period, obesity rates in America climbed from 5 percent to 42 percent, a more than 800 percent increase.

Your mitochondria are like a hybrid engine and can run on two fuel sources: fat or carbohydrates. Most of us fuel our metabolic engines with carbs, a dirty burning, inefficient fuel, instead of clean burning fats. Bad fats like trans fats and oxidized oils (especially from deep frying) harm our mitochondria. However, certain fats called ketones are the preferred fuel for mitochondria and help them repair, renew, and rebuild.

---

Turns out our bodies are exquisitely adapted to starvation. In fact, we need a little scarcity to clean house. When there is a lack of food, we switch to fat burning. We have weeks worth of fat stored on our bodies. When we burn the fat on our bodies (or in the case of a ketogenic diet, the fat in our diet), our cells clean up waste and debris, recycle old parts to make new cells, activate our antioxidant and anti-inflammatory systems, get rid of toxic belly fat, increase muscle and bone, and heighten brain function. For many, this is the key to healthy aging.

New science on longevity has identified key mechanisms that get turned on with starvation or anything that mimics starvation including calorie restricted diets (which can be challenging), time restricted eating (eating in a 8, 10, or 12 hour window), intermittent fasting (limiting calories a few days a week), ketogenic diets, and the fasting mimicking diets (five days of calorie restriction). They all do the same thing. Essentially, when you eat and what you eat come together to supercharge your mitochondria.

Muscle is where we have the most mitochondria. So diets that cause muscle loss – high starch and sugar and low protein diets also leave us with poor functioning mitochondria. We especially need more protein and higher quality protein as we age.

Additionally, we need the right vitamins, minerals, and other nutrients to make energy from food and oxygen. They include B vitamins, coenzyme Q10, carnitine, zinc, magnesium, selenium, omega 3 fats, lipoic acid, n-acetylcysteine, vitamin E, vitamin K, sulfur, and others. Our modern nutrient depleted diet provides very few of these mitochondrial boosters.

Food is a great source of these and other phytonutrients that supercharge your mitochondria including blueberries, pomegranate seeds, grass fed beef and butter, broccoli, sardines, extra virgin olive oil, avocados and almonds. One of the best fuel sources for the mitochondria is MCT oil (medium-chain triglycerides). It is one of the cleanest burning preferred fuel sources for your mitochondria, and an excellent performance enhancer before exercise.

Learning to feed your mitochondria well, using clean burning fuels, avoiding sugar and starch, increasing good fats, and ensuring optimal levels of key nutrients can provide a metabolic tune up. Combining that with mini breaks using time restricted eating can have powerful rejuvenating effects on your health, energy, and longevity.

---

# The Food and Detox Connection

When we hear the word, “detox,” most of us think of drug or alcohol rehab or fad “cleansing” diets. But our body actually “detoxes” all the time, and it keeps us alive and healthy.

Imagine if your toilet backs up for a week or if your sink is clogged up for a few days. It’s not too pretty. The same things happen in your body if your detoxification system fails. If your liver fails, you can’t process waste and you end up yellow (jaundice) and needing a liver transplant. If your kidneys stop working, you can’t process water waste, get very sick, and will die in a week or two without dialysis. If your colon is clogged up, well, you get the idea!

Thankfully our biology is designed to process waste and toxins through our intricate detoxification system.

The process of detoxification can be hindered by an overload of toxic insults, such as processed food, too much sugar and starch, and environmental toxins, among many others. Your detoxification systems also require a host of nutrients to function optimally.

The scary reality is that most physicians are not trained adequately in this part of our physiology (I know first hand—I went to med school!). Many doctors will tell you that the body knows how to get rid of chemicals and other toxins, which is true, however our detoxification system just can’t keep up with our onslaught of modern-day chemicals, toxins, and other insults we face at every turn. So, unfortunately both the diagnosis and treatment of impaired detoxification is almost never made.

Many of our common diseases are linked to an overload of toxins including heart disease, diabetes, cancer, and dementia. Environmental toxins have even been dubbed obesogens, which cause weight gain, and autoagens, which cause autoimmune disease.

Sadly, many of us are toxic waste dumps. More than eighty thousand chemicals have been introduced into the environment since the industrial revolution, and most have never been tested for safety. They cause inflammation, oxidative stress, damage the mitochondria, disrupt our gut function, create hormonal imbalances, and overload our detoxification systems.

A study of 10 newborns spearheaded by the Environmental Working Group (EWG), found 287 known toxins in the umbilical cord blood, before they even took their first breath—pesticides, DDT, PCB’s, phthalates, parabens, flame retardants, BPA, mercury, lead, and more. We are born pre-polluted and a lifetime of ongoing exposures compounds our toxic load. Our detoxification systems were not designed for such an overwhelming load of toxins.

In addition to air and water pollution, many toxins lurk in our food. Fatty liver is the number one cause of liver transplants. What causes fatty liver? Too much sugar and starch. Think about ducks force-fed corn to make foie gras (which is French for fatty liver). The biggest causes of kidney failure are high blood pressure and diabetes, mostly caused by too much sugar and starch in our diet.

---

Add to that the five pounds of food additives we eat every year, the pesticides and weed killers in our food, the mercury in our fish, and the arsenic and other toxins in our water—our bodies can't keep up. Sprinkle in a little alcohol, Tylenol, and other medications, and we end up in toxic overload.

## **Eat to Boost Your Detox Pathways**

The good news is that food contains nearly all the ingredients our bodies need to eliminate waste. Plenty of water helps remove waste through the kidneys and gut. Fiber moves waste through our colon quickly. Our liver, however, is a bit more intricate.

The liver has many pathways to remove toxins from the body with fancy names such as methylation, glucuronidation, acetylation, and glutathione conjugation, but each of these pathways need support, largely provided by phytonutrients and nutrients in our diet.

The food group that best boosts these pathways are the cruciferous vegetable family (broccoli, collards, kale, cabbage, Brussels sprouts). This family of vegetables, as well as garlic and onions, contain sulfur compounds that enhance the production of glutathione (the body's master antioxidant), glucosinolates, sulforaphane, and carbinol—all used during detoxification.

The liver also needs adequate levels of B1, B2, B3, B6, B12, folate, manganese, magnesium, zinc, selenium, and amino acids to facilitate all the chemical reactions needed for detoxification. Where can you find these liver-supporting superstars? In animal protein, seafood, nuts, seeds, and green veggies.

A rich array of phytochemicals, including flavonoids and other compounds found in herbs and spices help support the liver as well. Curcumin, found in the Indian spice turmeric, is a superfood that not only reduces inflammation and oxidative stress but is powerful in aiding detoxification. Rosemary, ginger, cilantro, dandelion greens, parsley, lemon peel, watercress, burdock root, and artichokes are all also powerful detoxifying foods to add to your diet on a regular basis. Green tea is also a super detoxifier that chelates (binds) heavy metals, among many other benefits.

Food is both the cause of overload of our detoxification systems and the solution. Adding high-quality protein, phytonutrients, vitamin and mineral-rich foods, along with lots of fiber and fresh clean water keeps our detox system humming and our toxic load low.

---

# The Food and Communication Connection

Every second of every day, your body is sending and receiving messages—it's what allows your body to process information and function, in every sense of the word. There are many different types of messages, like those that allow you to process pain, movement, and hunger, and like those that tell your blood vessels to constrict or dilate as part of your fight or flight response.

But, how do all the messages get to where they need to go? How does the food you eat, and all the magic it contains, find the right receptors to act upon? How does the body clear waste?

It's our transportation systems—our circulatory system (all the blood vessels) and our lymphatic system, a parallel set of vessels that clear all the metabolic waste from your tissues, and return it to the heart to be cleansed by the liver and kidneys.

The biggest killer in the world today is cardiovascular disease, which is mostly caused by insulin resistance, pre-diabetes, and/or type 2 diabetes. Clogged arteries cause heart attacks, strokes, amputations in diabetics, and even dementia. Contrary to popular understanding, this is not a plumbing problem that can be fixed by a bypass or rotor router treatments such as angioplasty or stents. It's not cholesterol that's the problem. It is triggered when inflammation and hormonal changes turn our cholesterol into fragile plaques that coat our arteries.

What causes the inflammation and hormonal chaos? Our diet. While environmental toxins, stress, our microbiome, and genetics all play a role, our diet is the biggest driver of cardiovascular disease. Studies have shown that a significant percentage of all heart disease can be prevented by changes in diet.

Our body contains about 100,000 miles of blood vessels, enough to go around the earth about 2.5 times. But these vessels are not just inert tubes that carry blood, they are also immune and hormonal organs and require the right support to function optimally. The lining of your vessels is called the endothelium. When it is dysfunctional, it gets stiff and can cause high blood pressure and hardening of the arteries. What drives this dysfunction? You guessed it. Our modern industrial, processed, high starch, sugar, and refined fat inflammatory diet, which is low in protective medicinal foods.

Studies show that even a single fast food meal harms blood vessels. But, much of the adverse effects can be offset by consuming phytonutrients and antioxidants, found in colorful, nutrient-dense plant foods. It may very well be that absence of medicinal phytochemicals and antioxidants is an important driver of heart disease (and most other diseases). Eating a nutrient-dense, whole foods diet, rich in phytonutrients, helps prevent the damage in the first place. Interestingly, studies show that the harmful effects of eating meat are neutralized when consumed along with lots of spices and phytonutrients. (Want to know more about the science on eating meat? Check out this podcast.)

---

Eating foods that increase nitric oxide, NO, are also important foods for vascular health. Nitric Oxide is a molecule that helps promote blood flow, adequate circulation, and healthy blood pressure. The amino acid arginine is the precursor for NO and the best food sources are pumpkin seeds, sesame seeds, walnuts, almonds, turkey breast, soybeans, and seaweed.

Healthy fats, like the omega-3s in wild fish, avocados, and extra virgin olive oil are also crucial for supporting your transportation systems. Omega-3 fats help improve endothelial function, blood vessel health, and prevent clotting. Avocados and olive oil are very rich in polyphenols, which improve endothelial function and reduce blood vessel inflammation.

A serious feature of cardiovascular disease is high blood pressure—it can lead to heart attacks, heart failure, strokes, and kidney failure. But what leads to high blood pressure? Genetics and toxins play a role, but the biggest factor is insulin resistance.

It should be no surprise to hear that the biggest factor leading to insulin resistance is what you put at the end of your fork three times every day. Eating too much starch and sugar, processed food, and refined carbohydrates can cause blood sugar spikes. Over time, this can lead to your body tuning out the effects of insulin, leading to insulin spikes. When this happens, your body goes into fat-storage hyperdrive.

Excess fat is inflammatory and can contribute to high blood pressure as well as nearly all other symptoms of cardiovascular disease. To make matters worse, if you are like about 40 percent of Americans you are also magnesium deficient. Magnesium relaxes blood vessels. Stress, alcohol, caffeine and sugar all deplete magnesium. Where do we get magnesium? In nuts, seeds, beans, and greens. What you eat and what you don't eat regulates the health of your cardiovascular system.

In order to keep your heart healthy and strong, it's important to have a strong and supported circulatory system along with a proficient waste-removal system. Your lymphatic system is responsible for clearing out internal waste and toxins. I think it's obvious that you don't want a build up of waste and toxins in your blood or near your organs, so doing everything you can to support your lymphatic system is crucial.

Our lymphatic system absorbs fats from our gut and transports it into our general circulation, bringing white blood cells to and from lymph nodes to help us fight infection. A high intake of processed foods, low levels of nutrients, and a lack of physical activity can contribute to a sluggish lymphatic flow, which can lead to arthritis, headaches, digestive and skin disorders, excess weight, and fatigue.

The heart pumps the blood around our blood vessels, but your lymphatic vessels need your movement, muscle activity, and breathing to pump the waste fluid back into your heart. There are lots of ways to improve lymphatic circulation including exercise, lymphatic massage, hot and cold showers, steam and saunas followed by cold dips, dry brushing, lots of hydration, and deep breathing. What you eat matters too.

---

Foods that tend to impair lymphatic function are the common culprits—processed foods, dairy, sugar, sweeteners, and too much salt. Foods that improve lymphatic function include green leafy vegetables, ground flaxseeds, chia seeds, avocados, garlic, nuts, seaweed, citrus fruits, and cranberries. Phytochemically-rich herbs can also help—echinacea, astragalus, cilantro, and parsley are lymphatic superstars.

As with each of our biological systems, the major regulator is food. Bad foods cause imbalance, dysfunction, and disease and good foods optimize.



---

# The Food and Hormone Connection

How does all the magic of our body happen? Who is the conductor? How do instructions for the myriad of things the body does get coordinated? We have a beautifully tuned communication system sending messages everywhere—our neurotransmitters, hormones, and immune messengers called cytokines.

Many things influence our communication system including diet, nutrient deficiencies, stress, toxins, the microbiome, and more, but the greatest influence is our diet with powerful measurable effects.

When these messengers (like instruments in a symphony orchestra) play out of tune, disease happens—depression, anxiety, violent behavior, ADHD, impaired learning, cognitive function, premenstrual syndrome, polycystic ovarian syndrome, sexual dysfunction, breast, cervical and uterine cancer, low libido, erectile dysfunction, inflammation, allergy and autoimmune disease.

You get the picture. It's a mess.

## The Biggest Obstacle to Better Health

The single biggest hormonal disorder we face is insulin resistance. One in two Americans has pre-diabetes or type 2 diabetes and 75 percent are overweight—all suffering from too much insulin, the result of the mountains of sugar and flour we consume. That insulin overload creates a domino effect. It drives all those excess calories into fat cells that produce messengers that increase hunger, slow metabolism, prevent fat burning, and spike inflammation.

In women, too much insulin turns estrogen into testosterone. The result is something misleadingly called polycystic ovarian syndrome. It is not an ovarian problem; it is a dietary problem. The extra testosterone in women also causes hair loss, facial hair, acne, infertility, and others.

In men, the testosterone gets converted to estrogen, which is why men with big bellies often have man boobs, low testosterone, impotence, and loss of hair on their bodies.

The same high sugar and starch diet also spikes the hormone cortisol. When you eat a sugar-laden diet, your body literally perceives it as a stress, just like when a tiger chases you. Adrenaline and cortisol increase, worsening insulin resistance and increasing cravings for sugar and starch. The cure: A whole foods, good fat, plant-rich, fiber-rich, low glycemic, and phytonutrient-rich diet. This is what I call the Pegan Diet.

---

## **The Connection Between Sex Hormones and Diet**

Many hormonal problems also results from imbalances in sex hormone metabolism including menopause, PMS, and female cancers. We live in a culture that drives excess estrogen, and increases toxic estrogens in the body. Too much sugar, low fiber diets, nutritional deficiencies, alcohol, xenoestrogens (pesticides, plastics, environmental chemicals that mimic estrogen), stress, and lack of exercise all drive hormonal imbalances.

Estrogen is metabolized and excreted through the liver and bile. If you are constipated or have an unhealthy gut microbiome (mostly caused by our low fiber, processed diet), the estrogen can get reabsorbed leading to breast and uterine cancer and worsening PMS and menopause. Certain fibers, for example in flaxseeds, contain lignans which help detoxify and improve estrogen metabolism reducing cancer risk.

For men, testosterone levels are inversely related to their insulin levels. Getting off the sugar and starch helps boost testosterone levels. Increasing fats also helps boost testosterone. In fact, your sex hormones are made from cholesterol. The best treatment for sexual dysfunction is cutting out the crappy diet, eating foods that help blood flow, and increasing good fats.

## **The Epidemic of Thyroid Disorders**

Thyroid function is also affected by what we eat. One in 10 men and 1 in 5 women have low thyroid function. Low thyroid function can be triggered by gluten, and diets low in zinc, selenium, vitamin D and iodine. Environmental toxins often found in our food such as pesticides and mercury also damage our thyroid. Adding foods rich in zinc (pumpkin seeds and oysters), selenium (sardines and Brazil nuts), vitamin D (herring and porcini mushrooms) and iodine (seaweed and fish) can help optimize thyroid function.

As you can see, our hormones and messengers are highly influenced by what we eat. The biggest factor impacting your communication system is reversing insulin resistance. The good news is that reversing insulin resistance starts at home, with your next bite.

---

# The Food and Mood Connection

The link between diet and our brain health is profound. You name it, food plays a role. Depression, anxiety, ADHD, dementia, behavior problems, violence or just plain old brain fog are all connected to what we eat.

I'll never forget my patient with recurrent daily 3 pm panic attacks. He was a hard-driving New York financier, working all day and eating, drinking, and partying all night. He ate so much at night that he didn't eat till late the next day. He had a big belly, insulin resistance, and wild swings in his blood sugar with low blood sugar, called hypoglycemia.

I talk a lot about the detriments of high blood sugar, but hypoglycemia can be a serious and life threatening emergency. When your blood sugar goes too low, it turns on all the panic signals, including high heart rate, fast breathing, sweating, and the feeling like you are dying, which is possible unless you get some food and raise your blood sugar.

As it turns out, this patient's panic attacks were directly triggered by his lack of food throughout the day and subsequent hypoglycemia. The solution: eat during the day and not at night, cut out sugar and starch, and reduce the alcohol. This was an instant cure for his panic attacks.

Whole new fields of research, such as nutritional psychiatry, have emerged since I wrote *The UltraMind Solution* in 2009 about how the body affects the mind. Stanford has a department of Metabolic Psychiatry. Harvard now has a department of Nutritional Psychiatry. Studies show that simply swapping out processed, sugary, starchy foods for whole foods is effective in treating depression—it's not just me touting the amazing ability of food to heal.

Studies also show kids with severe violent behavior transform when swapping out processed foods for whole foods, including a 75% reduction in the use of restraints and a 100% reduction in suicides, which is the 3rd leading cause of death in that age group. One study of violent juveniles found that simply giving children a vitamin and mineral supplement reduced violent acts by 91 percent compared to a control group.

As a Functional Medicine practitioner, I have to ask the important question: why were they violent in the first place; what was the cause? Their brains were starving for nutrients that regulate mood and behavior including iron, magnesium, B12, and folate. Just giving these kids vitamins for three months fixed their abnormal brain waves on EEG. The kids who also changed their diet had an 80% reduction in violent crime and those who stayed on a processed diet continued their violent ways.

Kids with poor diets (lacking fruits and vegetables leading to vitamin and mineral deficiencies) have worse academic performance, including lower test scores, lower grades, poor cognitive function with less alertness, attention, memory, processing of visual information, and problem solving, and increased absenteeism. The result is that kids are inattentive, disruptive, late or absent.

---

The most common deficiencies I see related to brain disorders include omega-3 fats, magnesium, vitamin D, zinc, selenium, and B vitamins. Omega-3 fats, in particular, are critical for brain health. Sixty percent of your brain is made of DHA, an essential anti-inflammatory omega-3 fatty acid. If your brain is on fire, you're likely fat deficient. Omega-3 fats form the basic structure of your cell membranes. If you don't have healthy cell membranes, your body's messenger molecules won't be able to communicate, and your health will suffer.

While many children are not eating enough brain food, they are also eating too many chemicals, including about five pounds of dyes, preservatives and additives that are linked to hyperactivity and worse.

While therapy, stress reduction, and movement are equally critical in many brain disorders, food plays a pivotal and often overlooked role.

Start small. Start with the Pegan Diet. Eat loads of veggies, some fruit (especially the low-sugar, nutrient-dense ones), whole grains (not flours), nuts and seeds, low-starch beans and legumes, and some high-quality meat, poultry, and fish. Focus on brain foods that have been shown to impact mood and reduce symptoms of depression and anxiety—foods rich in omega-3s, zinc, magnesium, vitamin D, antioxidants, and B vitamins.

---

# Food: What We Are Made From

Every cell in our body turns over every 7 years. Some turn over daily, some weekly, and some take longer. Ever wonder how we make new cells, organs, tissues, skin, muscles, bone, and even brain cells? We don't just manufacture them from thin air. The raw materials all come from what we eat. Do you want to be made of Doritos or grass fed steak? Coca cola or wild blueberries?

Our structure, which determines our function, is dependent on what we eat for the building blocks—the proteins, fats, minerals, and more that make up who we are. Funny enough, we are not actually made of carbohydrates and they are not considered an essential nutrient. If you are a healthy, lean male, your body is made up of 62 percent water, 16 percent protein, 16 percent fat, 6 percent minerals, less than 1 percent carbohydrate, and small amounts of vitamins. The problem is that our processed diet is about 50 to 60 percent carbohydrate, mostly low-quality, refined starches and sugars that are the raw materials for processed food. If those carbs don't become our structure, where do they go? We burn some, but most get turned into dangerous disease-causing belly fat.

Your structure matters—not just to keep you all together standing straight up and not collapsing into a pile of muscle and bone on the floor. Every part of you has a structure *and* function. If you are made out of poor quality parts, you will create a poorly functioning body.

Muscle loss and bone loss are huge factors in aging and age related diseases. Muscle is where our metabolism is (low muscle mass equals slow metabolism and worse). The effect of poor quality muscles is an increase in diabetes, inflammation, and aging.

In my surgical rotations in medical school, it became clear which patients would do poorly in surgery—the ones with poor diets, with obesity, and chronic diet related diseases. In surgery, their tissues would fall apart, were hard to sew up, and had a horrible texture compared to healthy people. We called it PPP for “piss poor protoplasm.” They had more complications, wound infections, and bleeding than healthier folks.

Imagine building your house out of rotten wood or disintegrating bricks. Remember the fable about building your house on sand? Or the one about the three pigs? Your structure and foundation matter. Why would you build your body from defective ingredients? For example, we need the best quality fats—our brain is 60 percent fat, our nerve coverings are all made from fat, every one of your 10 trillion cells is wrapped in a little fatty membrane. Do you really want to make them from oxidized damaged refined oils in your French fries or KFC?

We also need the best quality protein. The body makes most of its important molecules from protein including muscle, cells, and immune molecules. Not all protein is the same. The best type of protein to build muscle is other muscle—animal protein. You can get protein from plant foods, but the quality is lower and it has lower levels of key amino acids needed to synthesize new muscle, especially the branched chain amino acids (leucine, isoleucine and valine and also lysine and sulfur based amino acids).

---

There are also compounds such as phytates in plant proteins like beans and nuts that impair protein absorption. Rather than being turned into muscle, plant proteins are often just burned as calories. If you are vegan, especially as you age, you need to ensure you get these by increasing the overall volume of protein rich plant foods, adding protein powders, and supplementing with BCAA. If you want to eat less meat and include more plant proteins, combining them helps the body utilize the plant protein from beans. Think chili con carne!

And don't forget all the vitamins and minerals we need to build tissues, muscles, and bones, including vitamin D, vitamin K, calcium, magnesium, and more.

Next time you chomp down on something, ask yourself if you are fine with it becoming part of you for the long term. If not, don't eat it and find the best quality ingredients you can, ingredients that help you thrive.