The Seventy Percent Solution

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I loved practicing Tae Kwon Do. The forms are precise, crisp like an elegant dance. But I most especially loved the thrill of sparring. Stepping into the ring, ducking, dodging, kicking, and flying in spinning tornado kicks; I loved the surge of adrenaline that came with the controlled combat of tournaments. I competed nationally, even winning a bronze medal in the trials for the Pan American Games.

But that was a long time ago. A lot has happened since then—medical school, an internal medicine residency, a son, a daughter. I became an academic general internist, and I developed a chronic disease.

Like many with an autoimmune disease, my troubles had begun two decades before the diagnosis: loss of stamina and strength, problems with balance, bouts of horrific facial pain, dips in visual acuity. When I developed the foot drop, the diagnosis was made: multiple sclerosis (MS).

What caused my immune cells to begin their assault on my brain? My doctor said that genetics accounted for only 10 to 30% of the risk of MS; the rest was due to some combination of unknown environmental factors. He never told me what I could do to address those unknown factors, only offering interferon and copolymer-1 to reduce the risk of relapse. He said that fewer relapses would mean less disability, a greater chance that I'd still be walking, working, and living my life as I once knew it ten years later.

I started the injections right away. Over the next four years I had only one relapse—a transient weakness of the right arm. Still, I grew steadily weaker, losing more and more function and activity tolerance. Jogging left me first. Then, standing for any time became difficult. Ultimately, despite my use of the most current pharmacotherapies, walking and even sitting was tiring, so I needed a tilt-recline wheelchair. It was increasingly apparent that, with time, becoming bedridden due to my illness was inevitable. I was at a crossroads.

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Physician self-experimentation, driven either by passionate belief in our ideas or refusal to go quietly to our demise, has occurred for centuries. I had only two options: accommodation and acceptance of deepening disability despite optimal treatment, or increased involvement in my own health care.

Though I had once been a fighter, I was now exhausted. Still, I wanted to walk—even a few steps—as long as I could. I began my own study of the literature, reading article after article on PubMed, knowing that the seeds for today's clinical care were laid years, sometimes *decades* earlier in the basic science literature. I hoped to find a magic bullet that would halt my worsening disability.

At first, I looked for recent articles testing new MS drugs in animal models. Eventually, realizing I could not access those drugs unless I was in a clinical trial, I turned to articles concerning neurodegeneration of all types—dementia, Parkinson's disease, Huntington's, and Lou Gehrig's disease. Convinced that mitochondrial failure drove much of MS-related disability, I immersed myself in this literature over the next four years, gradually relearning much of what I had forgotten in my basic science years: cellular physiology, biochemistry, and neurophysiology.

I found basic science articles testing various nutrients to slow animal models of neurodegeneration, so I translated mouse-sized doses to human ones and began my self-experimentation with B vitamins, omega-3 fatty acids, alpha lipoic acid, coenzyme Q, and L-carnitine. I slowly added more vitamins and supplements to my list of brain nutrients. The rate of my decline slowed and I was grateful. However, although my decline had slowed, I was still declining. My disease was reclassified as secondary progressive MS, meaning there were no FDA-approved treatments capable of restoring my lost function. Walking became more difficult. Even taking a few steps using two canes exhausted me.

Then in the summer of 2007, another metamorphosis began. Reviewing a study protocol for the University of Iowa's Institutional Review Board, I learned about neuromuscular electrical stimulation and wondered if it might help me. I searched PubMed, finding 212 articles—three involving cerebral palsy, two involving stroke, the rest involving athletes, but nothing involving MS.

Still, I wondered whether neuromuscular electrical stimulation might allow me to walk for another year or two. I asked my physical therapist to let me have a test session. He told me that e-stim (as he called it) was not an approved treatment for MS—that it was painful, exhausted most athletes, and that while it could grow muscle, there was no guarantee that my brain could to talk to these new muscles. This potentially dead and useless muscle weight might make

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the small amount of walking that I could still do even more difficult.

But he did let me have a test session. He was right. It did hurt. A lot. But to my surprise, when I was finished, I was not exhausted. In fact, probably because of all of the endorphins released by the e-stim, I felt the best I'd felt in years. My therapist implemented a program of e-stim coupled with daily exercise.

At the same time that I began e-stim, I had an important epiphany. What about nutrition? Was I getting all the micronutrients that my brain needed? I returned to the literature. Bourre's[1,2] review on the impact of micronutrients on brain function and structure led me to add sulfur amino acids, kelp (iodine), resveratrol (flavonoids), and vitamin D to my daily regimen. As good as the article was, it did not list all of the building blocks needed for optimal brain health. I decided to think more critically about food. If I ate more foods that contained the vitamins, minerals, and essential fatty acids that I was taking in pill form each day, I might get important building blocks that had not yet been identified.

Identifying the food sources for those critical nutrients was not easy. The medical literature didn't have that information, nor did the registered dieticians with whom I consulted, nor did I see it in the food science literature. I turned eventually to Google, which did help me, nutrient by nutrient, to understand where various micronutrients I was taking by pill each day were located in the food supply. My new diet was nine cups of vegetables and fruit each day, grass-fed meat, and wild fish.

Determined to optimize everything I could to help my brain heal, I next looked more deeply at the environmental factors associated with poorly explained neurological and psychological symptoms. Two stood out: food allergies and toxic load. Food allergies can cause a myriad of neurological and psychological symptoms, typically without any abdominal complaints, decades before diagnosis and are very difficult to identify. My best option was to eliminate the most common offenders: gluten, dairy, and eggs.

I also learned about toxic load—increased mercury stores in the brains of people with dental fillings, high levels of the herbicide atrazine in private wells in Iowa, the strong association between pesticide exposure and neurodegeneration, the association of single nucleotide polymorphisms involving metabolism of sulfur and or B vitamins, and inefficient clearing of toxins[3,4]. Having grown up on an Iowa farm—with exposure to plenty of pesticides and herbicides, a mouthful of mercury, and tens of thousands of toxic chemicals registered with the Environmental Protection Agency—I knew there was not one single test to determine which, if any, toxins were being stored in my fat and in my brain. Deciding my best option was to improve my ability to excrete toxins,[5,6] I added already-methylated folate and B12, more sulfur amino acids, and fiber to my regimen.

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Physician self-experimentation sometimes does not go as anticipated. I had wanted to only slow my descent; I had no hope of recovery. The unthinkable—the unimaginable—happened, stunning me, my family, and my physicians.

Two months after starting my e-stim and intensive nutrition, I could again sit in a standard desk chair without being exhausted—for the first time in years. At three months, I could walk between exam rooms in the clinic. At five months, I could walk to the clinic, and at seven months, I could bicycle around the block. A year after starting e-stim and intensive nutrition, I was able to bicycle 18 miles, and the following year I rode a horse on a trail ride in the Canadian Rockies.

As a result, I've changed how I practice medicine. Now I focus on teaching my patients how to optimize their nutrition, reduce their toxic load, and reduce their risk of food allergies—often seeing their blood sugars improve, blood pressures fall, and angina resolve.

Three years into my healing, I am again experimenting. This time, it is a real experiment, with an IRB-approved protocol. I am testing my interventions in others with secondary progressive MS. So far, our results are promising.

In Science in 2002, Willett[7] noted that 70 to 90% of the risk for diabetes, heart disease, cancer, and autoimmunity is due to environmental factors. The genes do not drive most chronic diseases. It is the environment. It is time we stop blaming our genes and focus on the 70% under the individual's control. That is the real solution to the health care crisis.

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