

Dave: Many people in the biohacking community have had trouble with how much they overpay their life insurance provider because these companies haven't caught up with new scientific studies that have changed the way different diet types and exercises are viewed by the scientific community. For example, people who are committed to the Bulletproof Diet may have an increased level of a good kind of cholesterol called HDL, but some life insurance companies lump all cholesterol into one negative category like they were created in the 1950s. Oh, wait. That's because they were. A decision like this can greatly increase what you would pay for life insurance.

Well, Health IQ is a company that's decided to change that. Health IQ advocates for a health conscious lifestyle. They use science and data to fight for lower rates on life insurance for health conscious people including cyclists, runners, vegans and vegetarians, weightlifters, and other people who are in diets that actually make them feel better, perform better, and live longer. In fact, research has shown that people with a high health IQ are 42% less likely to be obese and have a 57% lower risk of early death. Many people don't even know their health IQ, let alone realize they can get a lower rate due to having a high health IQ. Health IQ has special rates on life insurance for the health conscious, and right now, Bulletproof listeners can learn more and get a free life insurance quote by going to [HealthIQ.com/Bulletproof](https://HealthIQ.com/Bulletproof) to learn more about life insurance for people who care about their health.

Female: Bulletproof Radio, a state of high performance.

Dave: Hey, it's Dave Asprey with Bulletproof Radio. Today's episode is a remastered version of one of the best interviews I've done to date. You're totally going to love it. I promise you that I will not take your time to direct your attention to something that isn't absolutely stellar, so enjoy this episode. We've remastered it for you. What this is doing is it's freeing up a little bit of time for me to finish the new book, and it's also making sure that you've seen the most important, most impactful, most useful content because I believe really deeply with Bulletproof Radio that given that we're pushing 50 million downloads, the number of hours that are consumed just listening to Bulletproof Radio is more than 100 human lifetimes. That's a big responsibility, so I'm not going to waste your time, not with numbers like that. This is one of those interviews that you absolutely have to hear.

Today's cool fact of the day is that Lachanophobia is a condition in which someone is intensely afraid of vegetables. The root word means vegetable in Greek. Not much is known about that phobia, but it's possible that George W. Bush was a Lachanophobe because in 1990, he banned broccoli from Air Force One. You know how important it is to eat meat that's 100% natural, meaning it hasn't been injected with hormones and that the cows were fed high-quality sources of food. Not everyone has the access or time to hunt around for high-quality grass-fed meat.

That's where Butcher Box comes in. They deliver healthy, 100% grass-fed beef, organic chicken and pork directly to your door, and their products are humanely raised and free of antibiotics and hormones. Each box comes with 7 to 10 pounds of meat which is enough for 20 individual size meals. You can choose from 4 different box types. All beef, beef and chicken, beef and pork, or the mixed box. That's enough food to last you

almost a whole month. You can also customize your box with add-on items like bacon, rib eye, and beef bones.

Each box also includes step-by-step recipe cards and a note from the butcher describing the cuts and forms featured that month. Plus, they deliver for free nationwide except for Alaska and Hawaii. The price is just \$129 a month which works out to less than \$6.50 a meal. At that price, it's a steal. Order now and get free 100% grass-fed burgers. That's 6 6-ounce burgers for free in your first box. Use code Bulletproof to get an additional \$10 off. Get started by visiting [ButcherBox.com/Bulletproof](http://ButcherBox.com/Bulletproof). You can cancel anytime without penalty, so give it a try. Head on over to [ButcherBox.com/Bulletproof](http://ButcherBox.com/Bulletproof) right now and get your free 100% grass-fed burgers and \$10 off with this code Bulletproof.

Today's guest is a friend and a former guest on the show, Dr. Terry Wahls. She's a clinical professor of medicine at the University of Iowa with more than 60 peer-reviewed scientific abstracts, posters, and papers. In short, she's a real doctor and a real researcher, but what really helps her stand out is that she gave TED Talk and just published a book called *The Wahls Protocol: How I Beat Progressive MS Using Paleo Principles and Functional Medicine*. This is pretty hardcore stuff. Terry was in a wheelchair and nearly disabled from MS and used a high fat diet, which we're going to talk about today, along with tons of vegetables to reverse her symptoms, and even some electrical stimulation. I have met with Terry multiple times in person, and she walks around, and you would never guess that she had MS and was wheelchair bound. Terry, welcome to the show and thanks for coming on again.

Terry: Great. Thank you so much for having me.

Dave: Now how long ago were you in a wheelchair?

Terry: In 2003 is when I made that transition. 2007, I was still in a wheelchair, began the interventions. By 2008, I was out of the wheelchair, walking with a cane, then walking without the cane, then biking 18 miles.

Dave: That is remarkable. It just completely ... In just, what, 4 years or so, you reversed. What has been going for a long time?

Terry: Well, in just one year, I went from struggling to walk 25 yards to being able to walk ... with 2 canes. 2 walking sticks. In about 6 months of my protocol, I was walking with a cane very comfortably, and then walking without a cane, and in a year, able to bike the 19 miles. I continued to slowly improve. This last weekend, I was on the treadmill, and I'm very excited about this, Dave, because I was at 4 miles an hour for 20 minutes, covered a mile and a half at a slow jog or a brisk walk in between the 2.

Dave: Wow.

Terry: It's thrilling, and I'm quite hopeful now. Within another year, I'll be able to jog pretty comfortably.

Dave: Is jogging a good, useful form of exercise?

Terry: Well, actually, I think intervals are much better. I do interval work and weight training, but being able to jog or run again, it just feels miraculous.

Dave: I can't imagine, after having been in a wheelchair like that. Maybe in a small relationship, I always had flat feet and terrible pain. I had arthritis on my knees when I was 14, and I didn't know you were supposed to be able to walk without it hurting. I just thought that was part of walking. Until I was about maybe 20 or so, I got orthotics, and for the first time, I'm like, "Wow, I walked across campus and it didn't hurt," just because it was outside my universe that you could move without hurting. I imagine it must be about a thousand gazillion times more when you get out of the wheelchair for the first time.

Terry: Well, since I had progressive MS, my physicians have been very clear that functions, once lost, never return. In the process of coming to terms with my illness, I had accepted that that would never come back. I was just going to get progressively more disabled, [inaudible 00:07:57] become bedridden. When I started my intervention, my goal was simply to put that off a few more years if I could. I had no idea that I was going to recover and walk again easily, bike again, and now even jog.

Dave: It's so remarkable. How did your family respond when you suddenly stopped declining even though all of medicine said you were going to continue? What was it like for you? I don't think you covered that so much in your book.

Terry: We had all accepted that I had progressive MS and things would get steadily worse. It's interesting for all of us. [I'd 00:08:38] get remarkably better, I'm walking around the neighborhood without a cane, and we were all still not sure what to expect. I remember the day that I decided I was going to try riding my bike for the first time. I put my helmet on, I was rolling my bike out, the family all rushed out, grabbed the bike, and we had this family meeting. "Could I try riding my bike?" My kids were terrified. They were crying. They were really upset. They were afraid I'm going to get hurt.

Fortunately, Jackie says, "Well, I think this is going to be okay." She told Zach to run on the right side, my daughter to run on the left side. She would follow on her bike. I got on the bike and biked around the block. At the end, we're all crying, sobbing. That was the first time that I, probably my kids, and my wife realized things really were changing, that we didn't know what was going to happen, and quite possibly, I was going to continue to recover and get close to normal function again at some point.

Dave: Wow.

Terry: That was a very, very big day for us.

Dave: How does your path of healing MS ... A lot of our listeners don't have MS, and actually, some percentage of them are bound to get it and don't know it because it's a neurodegenerative disease and it takes 10+ years from you when you might first have some autoimmune stuff happening. If you don't know that you're one of those people, how does what you did, which is superhuman, honestly, how does that apply to a

normal guy?

Terry: Well, actually, it's very interesting. In my clinical research lab, I have a lot of undergraduate students who volunteer in the lab for experience and credit. One of the requirements I have if you're going to work with me is you have to adopt the diet for at least 2 weeks and keep food blogs, you turn them in. If you actually do all of that, then I'll say, "Okay, we'll let you join the lab." These kids in their mid to late 20s, in their prime, are quite surprised with how much more energy they have, how much clearer their thinking is with this 2-week change. Several kids have discovered that their migraines have gone away.

Dave: Magically.

Terry: Their aches and pain stiffness have gone away. The vast majority of kids become converted, like, "I had no idea I could feel this good." Even people we think they are well often discover that they were just mediocre, and suddenly their energy and mental clarity is vastly better.

Dave: One of the goals with the Bulletproof Diet is to just get people for one day to feel that way because I think, as you've experienced with your students, when people get on a diet with the right nutrients and a clean diet, and we share a lot of common philosophies and recommendations, that once they feel that, why would you ever want to feel what used to be normal for you again? It doesn't matter how old you are.

Terry: I think a good way of thinking about this that I try to explain is it's like seeing the world either in black and white or color. Once you see color, who wants to dial back to black and white? Once you experience full health and vitality, why would you like to go back to feeling exhausted and befuddled again? No one does.

Dave: Did you ever use Modafinil or Provigil to try and get your energy up?

Terry: As a matter of fact, I did. Just like most people with severe MS fatigue, they gave me Provigil. First, 100 milligrams, then 200, then 300. It didn't do a lot, but the small amount that it did, I was very grateful for it, so, yeah, I stayed on that. If I go back to 2007, I started everything in November, and in February, I'd realized, "Man, I just was not sleeping." Then fortunately for me, Jackie said, "You know, Terry, why don't you stop the Provigil so [you could sleep 00:12:48]?"

Dave: It is an anti-narcolepsy drug, so if you get it in 300 or 400 a day ...

Terry: Like, "[Yeah 00:12:52]. Let's stop that." I stopped that, I slept well, and my energy continued to be great. Then in April, I called my neurology doctor. By this time, I've been walking around [and flying 00:13:08] without my cane, and I tell them, "There's been a change. I should probably see him." I'm over there in the waiting room. His nurse is walking around with a chart looking for people. I bet she's looking for somebody in a wheelchair and doesn't realize that I'm not in it anymore, so I stand up and go, "Hey, Cindy! Over here!" She looks at me and her jaw drops. "Dr. Wahls! Oh my god, what's happened?" I walk in, see her, see my neurologist, and he is incredibly impressed and

very excited by the changes. He, of course, was thrilled that I stopped the Provigil. At that time, we talked about slowly tapering my disease modifying drugs, which we did. We have the CellCept for a week, then have it again for another week, and then I was off. I've been off that since 2008 and I've done extremely well.

Dave: The reason I was asking is that we're going to about to start talking about mitochondria. I was on Provigil for 8 years and I didn't have MS. I had Hashimoto's thyroiditis, which I cured, and I certainly had some autoimmune conditions brought about by toxic mold exposure and some other things. I was pretty darned unhealthy, you could say, but I was on Provigil for about 8 years, and when you talk about just being tired and fatigue and all ... Also, I've largely gone off of it. It was something that was a daily thing.

What sparked that was, when you said it was like living in color or black and white, when I didn't understand the principles behind how to eat properly, I felt like I was always in black and white. I would take Provigil, and then the colors would come back. Like that scene in, whatever, Alice in Wonderland, the original movie, where suddenly, everything wakes up. You just triggered that memory for me. It's interesting that you did experiment with performance enhancing substances like that and got some benefit, but you're not on it now and look how you're performing. It's amazing.

Terry: Yeah. The real performing medicine, food.

Dave: I know. That old Hippocrates' "Let thy ..." What is Hippocrates' "Let thy medicine be thy food"?

Terry: Yes, absolutely.

Dave: Now you are a white-lab-coat-wearing university professor. You're one of those doctors who obviously doesn't get it because you're a doctor. There's almost a backlash against Western medicine, but you are not part of that backlash. What do the other more straight-laced conservative physicians say when you say food is medicine? It's almost flies in the face of what the drug companies are preaching.

Terry: Because I'm also a researcher and I write grants, get funding, do clinical trials, and every year, we have 2 research days, one for the Department of Medicine and one for the College of Medicine, where my lab presents our data, and so my colleagues have seen the progress with other progressive MS folks and the remarkable results that we are showing. Physician scientists, we love data. We like to give each other a hard time, of course, but it's very exciting. More and more people are coming by, and now that we have videos before and after, the gate changes. People are very excited, very thrilled. I'm going around to various departments at the university, giving research seminars, going nationally and internationally to present our research.

Dave: That is so cool. I just want to say thanks because when you can get people who are in a position to help so many people, like physicians are, to bring the food side in with hardcore medical physiology, biochemistry, and pharmacology that they're trained in, to bring all that together, it seems like as a biohack, I'm not opposed to pharmaceuticals, hormones, exercise, food, whatever the tools are that help me to improve a system, so

for you to take the credibility you've earned throughout your career and then to help apply that to helping other medical professionals help more people, thank you. We just need so much more of that, so keep it up.

Terry: Right. I talk about chemistry, physiology, we talk mechanisms. I have more basic scientists asking to join my lab because they know I have all this frozen blood and these very interesting results, and so people are now talking and pitching ideas as to how we're going to analyze our frozen serum.

Dave: That's even cooler. Do you have access to the military blood? Someone was talking about ... I think it was Tom O'Bryan from the Gluten-Free Summit who was on the show. He was talking about how they looked at autoimmune markers going back like 20 and 30 years from the military samples that they get from the draftees.

Terry: That would be very, very interesting to get access to that, writing another grant, getting funding, proposing, et cetera. That's more of a basic scientist, so I would find one of my partners to do that. I do this radical thing known as seeing patients intervene with people and seeing what happens overtime, and then I get my basic scientists who are the lab rats to analyze the blood to figure out the biochemistry and the physiology. Zuhair Ballas who's the chair of Allergy Immunology, he and I are planning what are the cytokine analyses that we'll be doing on the blood, and that's going to be really, very, very interesting to get this detailed immunologic analysis to see how things changed as the year progresses on our study diet.

Dave: Now I have to ask this, and I apologize to all of our listeners in advance because most people don't know about this, but melanocyte-stimulating hormone or MSH, are you looking at that by any chance?

Terry: Yes.

Dave: Yay! That's part of the new Bulletproof Diet book. I have a little bit in there about how diet affects MSH in the gut, so that's cool.

Terry: We had not yet finalized our panel. We have to sort out what we can do within our budgetary constraints, so I'll have to get back to you on that.

Dave: All right. My MSH is low, which happens when you have the genes that 28% of us have and you're exposed to toxic molds through breathing it. It's funny, I just got my test results back I've known for years because of symptoms that I was low, so I'm actually treating that now. We'll see what happens.

Terry: Interesting. Well, I look forward to hearing more.

Dave: Again, everyone, I apologize. Sorry, I just have to ask these questions when I get an awesome expert on the phone. Let's talk more about mitochondria. Would you give an overview of what is a mitochondria, what is ATP for people who are listening? Then let's talk about how you hacked yours and how other people might be able to hack theirs.

Terry: If we're to go back 1.5 billion years, the earth is covered with a terrible poison which is killing off large swaths of life. There are a few bacteria that have adapted to this toxic poison, and they've learned how to use the poison oxygen more efficiently in generating ATP. These ancient bacteria are engulfed by other bacteria and they develop a symbiotic relationship. This new bacteria will evolve overtime to become animals and eventually us, of course, so that means all of our cells have these ancient bacteria that help us generate adenosine triphosphate. Our mitochondria are really bacteria. In the most energy-intensive cells, our brain, our retina, and our heart, we have about 10,000 mitochondria per cell.

Now in medical school, I had to memorize lots and lots of reactions involving my mitochondria, but no one taught me what I needed to feed my mitochondria to be sure that they could have optimal function and from what kind of things were particularly toxic. That's one of the things that I investigated as I figured out from [reading 00:21:35] that likely, mitochondria were the root cause of my fatigue, my brain fog, and the atrophy or shrinkage of brain tissue in MS, Parkinson's, Lou Gehrig's, Huntington's, all these neurodegenerative processes.

With more [reading 00:21:56] study, I figured out that I needed all the B vitamins, zinc, magnesium, sulfur, antioxidants, and essential fats because the mitochondria have lots of membrane around the cell and within the mitochondria to run that chemistry. They're also incredibly dependent on Omega-3, Omega-6 fats. You want to flood your body with that nutrition so your mitochondria can perk up and come back to life. It also means you particularly need to protect them from heavy metals. Aluminum, arsenic, lead, mercury being the 4 most toxic.

Dave: Would you say that if someone potentially was at risk of getting MS, everyone is at some risk, but someone maybe has it in their family, that by maybe feeding their mitochondria a little bit better, avoiding some metals, detoxing regularly, are they going to improve their odds of just not getting sick?

Terry: I'll tell you, if you have a sibling with MS, 5% risk. Parent, 3% risk. 2 parents, 30% risk. Always, your diet and your environmental factors are 95% to 70% of your risk. To that end, nutrient-dense diet, detoxing is profoundly, profoundly helpful to make sure you keep a healthy, vital brain and healthy, vital mitochondria. That really goes true for all these complicated chronic diseases that many of my colleagues erroneously let their patients think, "You know, it's my DNA. I was just destined to get heart failure or diabetes or obesity or obsessive compulsive disorder or whatever," when it's really probably at most 5% genetic and 95% nutrient density of your diet and your toxic exposures.

Dave: Now when I say detoxing, a common response I get from the skeptic crowd online is, "Oh, there's no such thing. Detoxing, there's no such thing. Your body has natural detox systems and all that." Why do you focus so much on detoxing? We do have livers. We do have kidneys. We have skin. We secrete toxins. What's different?

Terry: Those definitely are the organs that are going to process and eliminate the toxins, but in order to do that, that's still a biochemical process that's dependent on having the

proper substrates. It's dependent on having a lot of ... You could induce those enzymes, up-regulate them, particularly if you have a lot of sulfur-rich vegetables, which is why my protocol stresses the sulfur-rich vegetables because that's going to really amplify your ability to detox. If you don't provide those systems the proper substrates, they're not going to function very well. The toxins that are being excreted will get placed in your fat and in your brain where they ramp up the inflammation, ramp up the neurodegeneration, and lead to progressively more damage.

Dave: In a lot of the work I do with Bulletproof clients, coaching work, for people who don't have MS and don't have chronic diseases but they just want to perform better, similar recommendations seem to work remarkably well. People who think they're well, and by all measures are well, when they add the sulfur-rich vegetables, they eat a lot more vegetables. They take the vitamins and all of the things that increase mitochondria function. The 2 things I focus on most are mitochondrial function and inflammation, and if you can get both of those one up, one down, magically, it seems like normal people become gifted with strange abilities they didn't know they had and sick people become well. Is there a set of people where this doesn't work or is this a universal thing we should all be doing?

Terry: I would say this is a universal thing. We're biochemical beings. Life exists because of self-correcting chemistry. That actually keeps the concentrations of minerals at a very narrow range in the cell, out of the cell. If they get too far out of whack, you die. Our body is as well-tuned as it can be, given the substrates that we give it. As a result, as we ramp up that nutrition, that self-correcting chemistry gets healthier, healthier, and healthier. Your health continues to improve. You tend to continue [youthening 00:26:51]. Obviously, you'll begin aging again at some point, but very typically, in my clinics, in our clinical trial, people are [youthening 00:27:01]. It looks like they [youthened 00:27:03] for about 10 years and then they begin to age again.

Dave: My own experience is that I certainly have more energy, more performance, more focus than I did ever in my 30s, and I'm just over 40. It's remarkable. Even things like skin quality and things like that are better than they were. Some of the other markers of aging, like there's a heart rate variability thing that predicts your age reasonably well, I score younger than I actually am. I'm certain that the fact that I've been "minding" my mitochondria for more than a decade and doing everything I can think of to make my myelin stronger, it seems like it just helped even though I didn't have MS, but who knows? Maybe I was on that path. It's very hard to predict.

Terry: Well, when you look at chronic disease on a molecular level and a cellular level, what we see, Dave, is that it's all the same disease. You have mitochondria that are not working well, too much oxidative stress. You have inflammation that's inappropriate and attacking the cells. You have nutrient deficiencies. You have toxins that are present, revving up the inflammation. We see that whether it's an autoimmune condition, whether it's a mental health problem, whether it's a neurodegenerative problem. Schizophrenia, obsessive compulsive disorder, MS at the molecular level are surprisingly similar. That is why if we treat people at the cellular and molecular level to address those broad categories, health improves.



It makes [clinic 00:28:47] vastly easier because now, I make a diagnosis, I give my prescriptions to take care of the acute problem, and then I make diagnoses of the nutritional adequacy, the probability of mitochondria's function, whether or not there's inappropriate inflammation, and the toxic overload. I address those problems, and it's a pretty straightforward addressing for whatever the underlying condition is, and coach people these lifestyle changes. They come back every month with more and more energy, more excitement, more vitality, and they're so grateful for getting their lives back.

Dave: It's certainly been my experience when I was 100 pounds overweight. I felt like I got my life back. I see this quite often with Bulletproof people who aren't treating medical conditions, but we all want to live more life. I'm sad that when I went to the doctor many years ago and said, "Something is wrong. I can tell something is wrong. What do I do," and the answer was, "I guess you should eat healthy and lose some weight." I'm like, "Ahh! Why didn't anyone tell me the kind of things that you're telling people?" Granted, we know a lot more now, but you're still at the forefront of getting the word out there through medical professionals.

Terry: It's interesting. I've taken an unusual approach. I'm doing a clinical research, writing grants, writing papers, and going down the academic route, but I care so much about the world that I'm also teaching the public, doing TED Talks, creating a website, writing books, and giving the public the same tools that I'm researching and letting them know, "Here's the science behind why I've designed it this way and why I'm doing the science this way." The public can decide, "Okay. It looks safe. I'm going to give it a try," or they can say, "Well, I think I'm going to wait for a few more trials, FDA approval," and they can sit back, but more and more, the public are ready to evaluate science simultaneously and take these very common sense, very easy ... Well, behavior is not an easy thing to change, but far easier than taking chemotherapy or disease modifying drugs that are going to shut down your immune system and give you life-threatening side effects, that could let you get your life back from an autoimmune condition, or a serious psychiatric problem, or a severe diabetes, obesity, and heart disease, things that are completely under their control.

Dave: Yeah, I'm grateful that you're helping people directly and doctors. One thing that not a lot of even Paleo people talk about as much but you talk about because you're a physician is myelin. I've been particularly fascinated with the types of fats in myelin, and I'm working on some new ways of increasing myelin strength. Because you had MS, I know that you would know a lot about myelin, but can you talk about what this is and why people who aren't sick should care about the state of their myelin?

Terry: Okay. Well, I'm going to go back even a little bit further. All of our cells are wrapped in a cell membrane which is made of fat. That fat is going to include saturated fat and cholesterol about 70%, Omega-6 fat, Omega-3 fat in about the 3-to-1 or 4-to-1 ratio. First, it's critical that those cell membranes have plenty of saturated fat, plenty of cholesterol, plenty of Omega-3 and Omega-6 because the cell membrane is how our cells communicate with the world and the cell functions. The myelin is that cell membrane wrapped around and around and around and around and around and around, so it is a very dense layer of fat. Saturated fat, cholesterol, Omega-3, and

Omega-6 fat. It makes me completely sad and crazy when people are talking about a low fat diet for somebody who has a myelin problem because myelin is made of fat, and you need to have saturated fat, you need to have cholesterol to make that myelin. You also need Omega-3 and Omega-6 fat as well.

Dave: You need undamaged fats, not deep-fried Omega-6 and saturated fat.

Terry: Oh my god, yes. I talk about this a lot in my book. Fat is a very, very important thing. If the fat is liquid at room temperature and you heat it, you will oxidize it and make trans fats, and it's catastrophic. You don't want to go near any vegetable oil that's been heated. If you're going to heat fat, it should be solid at room temperature, and then that fat is not going to be damaged. It'll be okay to consume.

Dave: One of the things, in fact, I haven't even showed this with you, it's a secret, but by the time we publish this podcast, I think it won't be a secret anymore, is I've been working for a long time to get a stable supply of grass-fed butter so that I can get ghee. We have Bulletproof Ghee coming out which is made from grass-fed animal because it's solid at room temperature for cooking. That's what I use it for, right?

Terry: Yeah, this will be great.

Dave: Yeah, I'm pretty excited. I've been working on this for years to try and find a supply that ... I don't know if it's a big enough supply, but there's a shortage globally of grass-fed butter, thanks to your work and to things like Bulletproof Coffee. Let's keep the shortage happening so we'll get more cows and more grass-fed farms, and maybe we'll have more grass. It could be good for the environment, too.

Terry: Yes, it'd be very good.

Dave: We talked about fat being stable at room temperature. What about things like canola oil and soybean oil? What's your take on those if they're "unheated"?

Terry: Well, I think they're catastrophic compounds. Canola oil is genetically modified. It has a lot of [erucic 00:34:56] acid and is toxic. Soybean oil, again, genetically modified. I would avoid that. I would prefer a combination of flax oil, sunflower oil to get the Omega-6 and Omega-3. Look for products that will help you get 3-to-1, 4-to-1 Omega-6 ... 3-to-1 Omega-3 is that ideal ratio.

Dave: That's an area where I've come across different information in that vegetable Omega-3s don't convert very well in the body, like a ratio of 45 to 1, into the really useful Omega-3s. "Flaxseed oxidizes so fast. Why do you do flax instead of just fish and krill?"

Terry: To get the Omega-3 for your EPA and DHA certainly is ideal. If you're going to use any kind of oil on your salad dressing, [I'm with that 00:35:59] in that 3-to-1 ratio.

Dave: Okay, if you're going to use it for salad dressing. Okay.

Terry: Yes.

Dave: I typically use an avocado.

Terry: I should clarify that.

Dave: Okay, that makes sense.

Terry: [You'll 00:36:07] use cold oil on your salad dressing, [I'm wanting 00:36:10] that 3-to-1 ratio. For your daily use, I'd much rather you eat cold water fish, wild game, grass-fed meat to get plenty of that EPA and DHA.

Dave: That makes sense. For my salad dressing, I usually use an avocado, and I'll blend it with Brain Octane Oil which is a saturated, medium chain fat. That way, I'm not doing it, and if I want the flavor, I'll splash in olive oil, but I try to keep the Omega-6s down even from olive oil. That's, of course, extremely fresh, dark glass, packed olive oil kind of thing. I did, however, though, in a recent test, depending on ... There's different labs and they're saying I'm low in Omega-6 fats. At least in one certain kind. In GLA. The question is are most labs, because so many people eat so much Omega-6 these days, are the standards off? Have you come across this?

Terry: No. If we're taking a lot of Omega-3 oils, we can end up over-replacing the Omega-3s and not having Omega-6. Particularly, you and I, we're attuned to the dangers of Omega-6, so we've taken the vegetable oils out. If we keep supplementing the Omega-3s, we can overshoot and get the ratio of Omega-3s and Omega-6s swung too far to the Omega-3. That's a potential hazard. Ideally, you get a fatty acid analysis so you know where your ratio is and realize, "Oops. I overshot. I'm going to cut back my supplements so I can get things back in a proper balance." That is frankly the hazard. Anytime we're supplementing minerals or fats is to figure out how to do that without getting the ratios off the optimal range.

Dave: It's tough, too, because so many of the optimal ranges, like, "Whoa, you're 45? So if you're 45, the average for the world is this, so that's about the middle of the range," and you're like, "Oh, I don't want that average. I want average for an ass-kicking superhero," if only we know what that is.

Terry: That is exactly true. What is the reference range that we should use for, for example, our optimal Vitamin D level or optimal Vitamin B12 level? Total levels are hard to interpret. It's the ratios that are most useful. Finding somebody with enough nutrition experience to help you know what is that target ratio is difficult, and this is an emerging field, Dave, so you're not alone.

Dave: I am so fascinated by this stuff. I also think there's a big genetic component to this. The more I look at how people's immune response happens based on this presence of this gene or that gene, the more complex it is and the more it's really apparent that what you do with your environment is so much more important than the genes you have, for most genes. Some genes, you're just screwed if you have it.

Terry: True, but mostly, it's in our environment. The other thing that I think too many people

are not aware of, my epigenetic heritage, which is how the environment interacts with my genes without changing the DNA, has been passed on to my 2 kids, Zach and Zeb, but my choices get passed on for 4 generations.

Dave: Now why do you say 4 generations? Because we know the Indians said 7, and I know 2 we've proven, but 4 is an unusual number to choose for that. Why 4 generations?

Terry: That's what I have read from other geneticists, and part of it has to do with Pottenger's work. When they fed the cats diets that were not so optimal, the cats progressively deteriorated, and at the fifth generation, they were sterile. They did that repeatedly. If at the fourth generation, he gave them the optimal nutrient-dense diet, in 4 generations, the cats would have a normal phenotype.

Dave: Interesting. I remember that is 9. My memory is just off. I covered that in the Better Baby Book, but, okay, it's 5. That's cool.

Terry: The epigeneticists are presuming that, and we don't know this obviously for humans, but we're presuming if it took 4 generations or 5 generations to create sterility for the cats and that with 4 generations you could recover them back to a normal phenotype, that we think it's likely 4 generations for humans. We don't know for sure.

Dave: I hope it's only 4. Humans and pigs are so sensitive to toxins compared to rats, mice, cats, and all these other things, way more sensitive because of the way we process, the way we bioaccumulate. I suspect that we may be more sensitive, but this research didn't apply just to girl cats. This means that if you are going to be a father someday, that what you do with your food affects your offspring as much as what the mother ate before pregnancy. Then during pregnancy, obviously, what the other mother eats is of vital, vital importance, but we're talking big stuff. If you think you're going to get drunk, have pizza, beer, or smoke, but you're the dad, it's okay, it doesn't work like that.

Terry: No. Our health that we have was dependent on the previous 4 generations. When people say, "Oh, grandpa smoked, drank alcohol, and he lived to be 80," well, his previous 4 generations were all working really hard, had great nutrient-dense diets. To think that we could smoke and have terrible choices and have that not affect our offspring is just so wrong and so naïve and so unfortunate.

Dave: Now this is probably a rough question, but are you concerned about a global population problem?

Terry: Well, it's out of my area of expertise. I think that having 9 billion people in this planet is probably not going to be a good thing, but my observation is the chronic health is declining. The chronic health is worsening. When I look at our kids, one in 3 being obese, or one in 2 if you're African American or Hispanic, I don't know what the world population is going to be, but I see fertility rates falling. I see chronic disease cropping up. I think our ability to fight infection is declining. I don't know what will happen to the population, but I don't see continued growth. [That was 00:42:59] going on infinitely because we're wrecking the environment. We're wrecking ourselves. Fortunately, I do see segments within the population understanding diet and lifestyle and returning to

more health promoting ways.

Dave: It seems like given this 4 generation problem, it seems to me like we have a population problem now, but we'll have less of one going forward because it is vanishingly difficult to conceive. One in 8 couples, they can't conceive without artificial help, and it's getting worse.

Terry: Exactly. This is happening internationally. Sperm rates are dropping globally internationally. Yes, I completely agree.

Dave: It's amazing. Lana has a small sample size, my wife, Dr. Lana, but because of the Better Baby Book, she does fertility coaching. She's got clients in the Middle East, in China, in the UK, in India. They do it over Skype, but it's interesting. It's not just in the US. It's not just in North America. It's even in so-called younger countries or countries that haven't had the Westernization for more than a couple of generations. It seems like it's global. I look at my kids and I've done everything possible since before they were born to try and reverse this trend. They eat the cleanest stuff I can find and afford, and I devote more time and energy to it than I'd like. I just hope that when they turn 18, they're not out eating pizza and god knows whatever else and undoing it because I know when I was 18, that's probably what I would have done. I'm really hoping to pass the values on.

Terry: I'll tell you, my teenage kids did fall away from the good nutrition, but fortunately for me, my daughter gets migraines, so she pretty quickly like, "Okay, these migraines are miserable," so she's back eating a really good diet. My son is also coming back to eating really clean. Your kids will probably do that, but hopefully, it'll be for a very brief time and they'll come back.

Dave: I was just about to ask [because 00:45:12] my next question was what happened with your kids, so you've been down that path already and you gave me great hope there. Let's talk about intelligence for a little while.

Terry: Sure.

Dave: I am putting together a really comprehensive brain program, and I would love to know what you recommend for increasing IQ.

Terry: Physical exercise is probably one of the most important because physical exercise stimulates nerve growth factors. You'll also want to do learning. If you could learn a new language, that's very, very powerful. Take care of stress. [HeartMath 00:45:55] and other programs to help you decrease your sympathetic tone, [boost 00:46:01] your parasympathetic tone a little bit, that would be very helpful. Maximize your mitochondria and fat. You need lots of good, healthy fat for your brain. Very nutrient-dense diet. That would be my approach.

Dave: Sounds like a wonderful approach to me, very similar to the one that I do. When you talk about toxins, what about glutathione which is one of those big things in the liver? What do you do about that? What's its role with mitochondria?

Terry: Glutathione synthetase is stimulated by [brassica 00:46:41] vegetables, vegetables in the cabbage family, in the onion family. It's another great reason to include those in your diet. Lipoic acid can be helpful. Now unfortunately, taking glutathione by mouth does not work very well unless you have liposomal, or you could take ... Some programs use IV glutathione which can be helpful.

Dave: I've done IV glutathione a few times. It definitely worked.

Terry: [You like 00:47:10] that, huh?

Dave: Yeah. I do the liposomal plus some other molecules for better absorption. That's one of the products that I make. Do you use glutathione?

Terry: As a matter of fact, I use your product every morning.

Dave: You are using it.

Terry: Yeah.

Dave: That's amazing. Okay. I knew that you've tried some, but I didn't know if you still use it.

Terry: No, I still use it. I discovered if I miss a few days, I can appreciate the difference, so that keeps me very consistently with it. I find it to be quite helpful.

Dave: Thank you. That's amazing.

Terry: I didn't mean to give you that infomercial, but you got it anyway.

Dave: Yeah, no, I was really not sure if ... I know I shipped you some a while back, but I haven't asked you about the feedback from it. All right. Raw meat. I was a raw omnivore for a while when I was recovering from being a raw vegan. Most people freak out about eating raw meat. What's your take on raw meat?

Terry: If you look at the arctic Inuit, I think 10 months out of the year, they're consuming meat. It's mostly fermented, and traditionally, it would have been fermented and raw. They had terrific health and vitality. I believe the [Maasai 00:48:25] in Africa have a lot of raw meat, raw milk, and blood mixed in with the milk that's part of their culture and traditions. Certainly, we have traditions that thrive on that. In our environment, we have some challenges doing the raw meat in terms of finding safe sources from a public health perspective. I talk about raw meat in those societies in my book with a big caution that because of the challenges of how you find that product, I can't make that recommendation, but we absolutely have societies that have thrived on raw meat.

Dave: Yeah, it's risky. What about parasites? Do you cover those? Did you look at those in yourself? Is that a role? Do they play a role in MS?

Terry: Actually, it's very interesting. There's a study using whipworm. People ingest the whipworm and they've had decreased numbers of lesions and improved functional

activity.

Dave: For MS, not just for [crosstalk 00:49:30]?

Terry: For MS.

Dave: I took the pig whipworms.

Terry: That's it. Isn't that interesting?

Dave: Yeah, I did it.

Terry: That study is done in Madison and they're continuing to work on that. I believe there's application to do, another level of trials, and patent applications, et cetera.

Dave: Did you do it?

Terry: Did I do it? No.

Dave: Okay. I can tell you that if you scramble the whipworm eggs, they're delicious.

Terry: Well, I'll keep that in mind.

Dave: No, I just drank a little vial of them, and it was scary. This was maybe 6 years ago or so. I tried it. I ordered some from Thailand, and I never felt any difference. I have no idea if they did anything, but it was spooky.

Terry: Around the globe, 80% of humans have parasites of some type. There's a big hygiene hypothesis that as the infections go down, you use vaccinations, you have fewer viral infections, antibiotics [inaudible 00:50:26] fewer bacterial infections, and the parasites are removed, that also in that same sequence of time lies a dramatic uptick in the autoimmune problems. One of the theories that's getting more and more traction is that those infections help regulate and mature our immune cells so they are not attacking self, and that perhaps these parasites have more of a symbiotic relationship than we appreciate. Now those answers aren't fully in yet, so we don't know.

I think we're having a huge experiment what the long-term consequence of vaccinations [inaudible 00:51:09] our children aren't getting these viral infections, the antibiotics, they aren't getting the bacterial infections, what is the long-term consequence in 30, 40, 50 years? It's not quite so clear what the health risks are. It could be that we're saving a few lives by using vaccines and antibiotics, and I don't argue that, but we may be increasing the burden of chronic disease as a result. Then you have a public health policy, lost a few lives versus the chronic poor outcome, lost the quality of life, and health care expenditures, productivity, et cetera. These will be debates that we'll look back at at 100, 200 years. They'll have a very interesting perspective on the wisdom of those vaccines. [inaudible 00:52:12], we may decide that it was not such a good thing. Who knows?

Dave: It's really a tough thing as a parent of young kids. My wife, a trained physician from Sweden, they have an entirely different protocol and timing for how often and what vaccines you give to a child versus in the US where it's like you just pump it all in pretty quickly as soon as they're born. Those differences seem to have a huge effect and it's just not that well studied on either side. It's concerning for sure.

Terry: I think it's concerning. Another area that's not well studied ... You have the killed virus attenuated so it's not going to cause infection, and then you add an adjuvant so you get more of an immune response. We don't have a lot of studies to guide us how many doses of adjuvant can you give at one time in one day safely and what are the health consequences of all those adjuvants. I think there are a number of unknowns. The other question I would ask is how many of these vaccines are lifesaving? I don't really know. I'll freely admit that the vaccine question is outside of my area of expertise, but as the hygiene hypothesis is gaining more and more ground as one of the contributing factors for autoimmunity, it gives me a great deal of pause.

Dave: My kids play outside in the dirt 2 hours a day, and sometimes they wash their hands, so let's hope ...

Terry: Don't let them [wash them 00:53:50] too often. [Crosstalk 00:53:52].

Dave: Exactly. Let's hope it's the right thing, and let's hope it was the right dirt. Who knows? All right. I have a couple more questions for you if you have time.

Terry: Please.

Dave: All right. 2 other things for mitochondrial function because everyone benefits from better mitochondria. There isn't a downside to having highly functioning mitochondria. Number one, electrical stimulation. How does that improve mitochondrial function? Because you're one of the few people who talks about using it besides me.

Terry: Well, the electrical stimulation, for the other listeners who may not know about it, it's done through the skin. We use cutaneous pads that get applied to the muscle. You find the motor point which is over the nerve going to the muscle. You have a battery-operated device, usually handheld. You turn up the current, and the current flows through, causes a muscle contraction. You do a volitional contraction at the same time. By working the muscle more vigorously, the muscle will end up adding more mitochondria per cell and the mitochondria will be more efficient. There'll be less oxidative stress. You also have more nerve growth, more insulin-like growth factor and nerve growth factor locally at the muscle to help you get larger, healthier, and more bigger muscle cells.

Dave: Is that going to increase your IQ, too, because you're getting that effective exercise?

Terry: It might. We don't have any lab studies to confirm that, so that would simply be speculation, but the potential mechanism is there, yes.

Dave: What an amazing answer. I feel like there might be something there, but I have no idea.



I was hoping you would say, "Oh, there's 15 studies," but, all right, so maybe.

Terry: Maybe.

Dave: The other question is around our good friend MCT oil. What is its role in mitochondrial function?

Terry: The mitochondria can utilize sugar, amino acids, and fats to generate energy in the Krebs cycle. The MCT oil in the liver will be converted to ketone bodies such as hydroxybutyrate which can enter past the blood-brain barrier, go up to the brain, and enter the Krebs cycle and generate energy very, very effectively and efficiently. The ketone bodies are great stimulators of nerve growth factor, and so they are fabulous, fabulous fuel for the brain. The other beauty of MCT oil, it cannot get converted into fat as in your fat cells. It's only going to be burned as fuel in your mitochondria. It's terrific stuff.

Dave: That is one of the many reasons that it's there in Bulletproof coffee, and, man, I feel the difference versus no MCT oil. It's something that I travel around the world with in a little bottle. You saw me pour it on my asparagus I think the last time we had lunch together just because it matters.

Terry: Another beauty of MCT oil ... I like to be in ketosis. I feel better and more energetic in ketosis. By using MCT oil to maintain that ketosis, it lets me get more carbs in my day, which lets me have a nutrient-dense diet that has all the vitamins, minerals, and antioxidants. If you do ketosis without MCT oil, you have to reduce your carbs to about 20 grams, and at that level, you're going to develop Vitamin C deficiency, Vitamin K deficiency. You can probably maintain your Vitamin A with liver. You won't have enough with the phytonutrients. You eventually are going to start running to chronic disease because of nutrient deficiency, but with MCT oil, we have a buffer, so we can get the best of both worlds.

Dave: That is an elegant way of expressing it. What about just eating coconut oil?

Terry: Coconut oil, I love to cook with it. That's another fine option. The MCT oil taste is a little easier for some folks. They don't care for the taste of coconut oil. It's just another very nice option.

Dave: Got it, and there's that difference in the percentage of MCT in coconut oil about lauric acid versus the shorter chain.

Terry: Yes.

Dave: Awesome. We are down to our final question, one you've answered before, but one that I'll ask you again because usually, people come up with different answers. What are your top 3 recommendations for people who just want to perform better at whatever it is they do? It doesn't have to come from MS or anything medical or not. Just your top 3 most important things. What matters?

Terry: Well, you want to take out the foods that are at highest risk for food sensitivities. From my perspective, that's gluten, dairy, and eggs. That's Step Number 1. Step Number 2, I want you to get more vegetables in. I do the green sulfur color. Then Step 3 is you have to have good, high-quality protein. Those are the first guidelines I lay out.

Dave: I recommend that everyone check out your book. You have an amazing background and an amazing story. Your book is well written. If you haven't seen your TED Talk, if you haven't seen Terry's TED Talk, you should see it. It's quite amazing. We'll put links to your book, we'll put links to the TED Talk, but tell everyone the title of your book, give everyone your URL, and just how they can find you.

Terry: Sure. The Wahls Protocol: How I Beat Progressive MS Using Paleo Principles and Functional Medicine. My website is TerryWahls.com. That's T-E-R-R-Y-W-A-H-L-S.com. I invite all those just to go to the website, download the free materials that we mentioned in the book. There's a terrific recipe guide and some information on toxins. Follow me on Twitter at TerryWahls. Follow me on Facebook, Terry Wahls MD.

Dave: Terry, thanks for being on the show again. I'm always pleased to get a chance to support your work and to let people know that you've got a new book out. What you're doing is important and I really, really appreciate it, so thanks for being on the show.