David Perlmutter, MD, FACN, ABIHM: Combating Inflammation in the Brain—What is Good for the Body Is Good for the Brain

Interview by Karen Burnett

***David Perlmutter, MD, FACN, ABIHM**, is a board-certified neurologist and fellow of the American College of Nutrition who received his medical degree from the University of Miami School of Medicine, where he was awarded the Leonard G. Rowntree Research Award. After completing residency training in neurology, also at the University of Miami, he entered private practice in Naples, Florida, where he serves as medical director of the Perlmutter Health Center and the Perlmutter Hyperbaric Center.*

Dr Perlmutter also serves as adjunct instructor at the Institute for Functional Medicine in Gig Harbor, Washington. He is recognized internationally as a leader in the field of nutritional influences in neurological disorders. He has contributed extensively to the world medical literature with publications several journals and is the author of three books.

In 2002, he was awarded the Linus Pauling Award for his pioneering work in innovative approaches to neurological disorders. In addition, he received the 2002 Denham Harmon Award from the American College for the Advancement in Medicine for his work in advancing the understanding of free radical biochemistry in neurological diseases and is the recipient of the 2006 National Nutritional Foods Association Clinician of the Year Award. He received the 2010 Humanitarian of The Year from the American College of Nutrition. (*Adv Mind Body Med*. 2013;27(1):24-30.)

Advances in Mind Body Medicine (Advances): Tell us about about your background. Did your childhood involve family members who were interested in medicine, were you interested in medicine as a child, and what drew you to the study of the brain?

Dr Perlmutter: That is actually a wonderful place to start because, indeed, a very influential family member had a big impact on the rest of my life.

As a kid, my father was not around that much because he was a very active brain surgeon and, as many young men would do, I did everything I could to be able to spend time with him. Knowing that it wouldn't happen outside of the hospital, I realized that I'd have to spend time with him on his turf.

Even as a 12- and 13-year-old, I was in the operating room—initially watching and then, as I entered middle years, actually assisting him in doing brain operations. During that very influential and formative time in my life, I was getting lessons in brain anatomy and learning about what functions were served by this particular part of the brain or that particular part of the brain. So I became quite interested, at a very impressionable time in my life, in brain science.

When I went to college, it gave me an opportunity to spend the summer doing a brain research project at the University of Florida. I was even able to publish a research paper in the *Journal of Neurosurgery* and present my findings on a national level when I was 20 years old. That was close to 40 years ago, so I had a very early start in the neurosciences.

Advances: Where did you grow up—in Florida?

Dr Perlmutter: Yes, I grew up in Florida and after graduating from college, I ended up there, at the University of Miami, for my residency in neurology. Subsequently, I moved to the other coast of Florida, to Naples, where I have been for the past 25 years practicing neurology.

Advances: Did you experience any surprises in medical school that influenced the direction of your work?

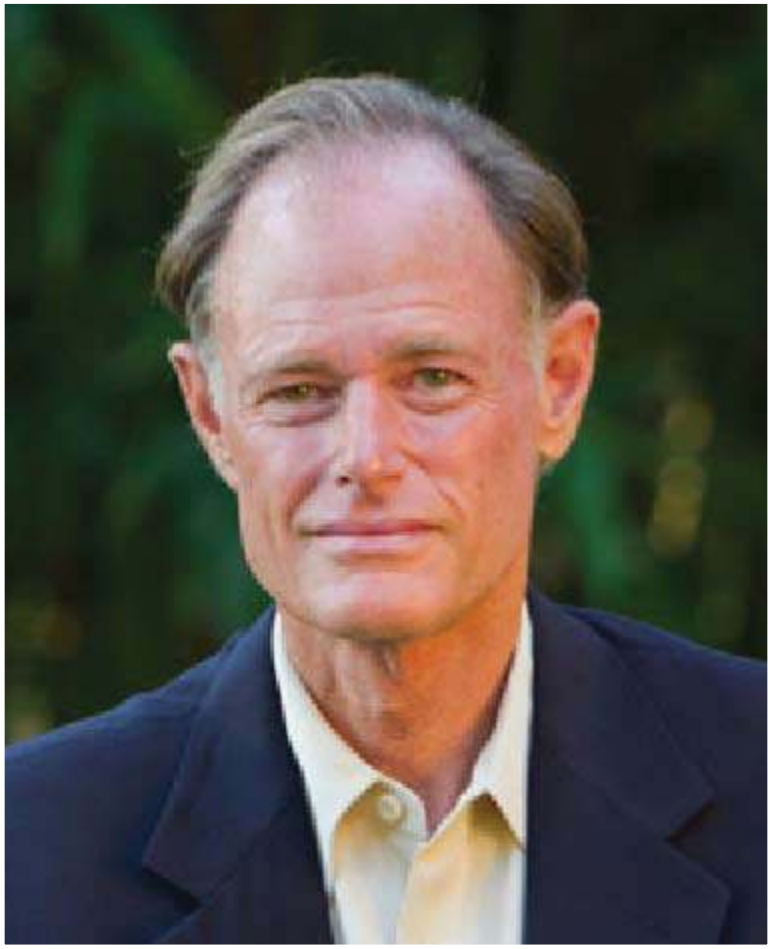
Dr Perlmutter: What was most surprising to me in medical school was the complete absence of exposure to anything related to diet and lifestyle. I grew up with pets, as many people have, and always knew that if our dog was sick, we would take the dog to the vet. The first question the vet would always ask would be, "What are you feeding him or her?" I was very surprised that that didn't translate to human health.

I am very appreciative for the wonderful medical education I received, but I found that [aspect of it] to be very lacking. This clearly influenced the direction of my work—if I was going to understand the influences of nutrition and other lifestyle choices, in terms of health and physiology and

illness, that would be work that I would end up having to do on my own.

Advances: Did you have any mentors who inspired you?

Dr Perlmutter: There have been many along the way. Early on I had a meeting with about six other people, a round-table discussion with Jeffrey Bland, PhD, in Seattle, Washington, probably 22 years ago. The information that he was able to give me related to the influences of nutrition on human health and physiology was very, very profound. That gave me the understanding that there really is good, hardcore science that serves as an underpinning for the notion that—oddly enough—what we eat has a bearing on our health. That could be almost parenthetically sarcastic.



This [concept] has been part of humanity since we have been on this planet and it's only in the last 80 years of our existence that the role of nutrition in health and wellness has been neglected.

Advances: Western medicine tends to compartmentalize specialties in its approach to healing. You have said that preventing damage to the brain and preventing Alzheimer's disease can be viewed in the same light as taking care of heart, health, and general physiology. What do you mean by this?

Dr Perlmutter: I do a lot of lecturing at integrative medicine, functional medicine, and alternative-medicine venues, and for some reason the idea of lifestyle issues applying to brain health and resisting disease has never, until very recently, gotten a lot of attention. We all understand that there is a heart-healthy diet, although what it exactly is certainly is up for debate. We all know the basics of weight-bearing exercise for preventing osteoporosis, etc; but for some reason the brain and brain health have always remained distanced from consideration.

In fact, the brain is absolutely sensitive to those same influences that affect every part of the human physiology. The cornerstones, the key players, in degeneration of any part of our physiology are two things: the action of free radicals and the fundamental role throughout the human body of inflammation.

We are all familiar with free radicals; they are why we like to take antioxidants, to combat free radicals. We also clearly recognize, for example, that the narrowing of a person's coronary arteries—which is what coronary heart disease is all about—is ultimately an inflammatory issue. It's one of the main reasons that people take aspirin, well beyond its blood-thinning abilities. We know that the various diets people go on that tend to reduce inflammation are positive issues in terms of coronary artery disease.

What turns out is that the brain is just as susceptible, if not more susceptible, to inflammation than is the heart and other parts of the body. Diseases like Alzheimer's, multiple sclerosis, and Parkinson's are fundamentally and primarily caused by inflammation in the brain. The beauty of this understanding is that it opens the door to a wide variety of influences, over which we have control, that can reduce inflammation and therefore can create a scenario where the risk of these diseases is reduced. If the disease is already present, then the rate of progression can be attacked.

Advances: So inflammation can cause damage independently of oxidative stress?

Dr Perlmutter: Yes. Inflammation in and of itself is a bad thing. Many of the inflammatory mediators, chemicals that are called *cytokines*, are directly problematic in the brain and other tissues just because of the damage that they wreak. They actually activate certain gene pathways that are destructive; they damage the function of mitochondria; and at the end of the day, when inflammatory chemicals and/or reactive species like free radicals are present, they ultimately damage mitochondria.

Mitochondria are the energy-producing parts of every cell and cells may have thousands of mitochondria. When mitochondria are damaged, it ultimately leads to the cell initiating a mechanism whereby it commits suicide, a process

called *apoptosis*. Thereby, we have dropout of very important cells and that is obviously not what we are looking for in our brains.

Advances: What are some of things that we can do to prevent inflammation and to prevent the free radical activity?

Dr Perlmutter: The bottom line is that this [answer] may be somewhat unique, depending on who that person is. What is his or her heritage, genetic makeup, diet, lifestyle, etc? But overall, a diet that reduces free radicals is one that is rich in colorful food. We know that a variety of different foods tend to activate the gene pathways that then turn on the body's production of powerful antioxidants.

One powerful gene pathway is called the *Nrf2 pathway*, and we can activate that pathway to cause the downstream increase of antioxidant production in our bodies by eating foods like broccoli, green tea, coffee (oddly enough), and the omega-3, DHA. We also know that the Nrf2 pathway, which turns on antioxidant production and also reduces inflammation, is also activated by lifestyle choices like calorie restriction and physical exercise. Beyond taking antioxidants, we actually turn on the genes, a process called *epigenetics*, to [stimulate] production of a whole series of powerful antioxidants and detoxification systems while we reduce inflammation.

Advances: Do you recommend certain vitamins as well to help protect the brain?

Dr Perlmutter: Even before we get to specific nutritional supplements, step one would be [looking at] the foods you eat. For the brain, by and large, the most important foods to focus on—and for the entire physiology—[help to supply you with] adequate amounts of fat.

Fat is a wonderful nutrient. It is one of the three key macronutrients in human physiology. This is very important because we live in a very fat-phobic society where everything is either low-fat or no-fat, as if that is supposed to impart some healthful property to food. In reality, nothing could be worse. We must derive our calories from one of three sources: fat, carbohydrate, and protein. Generally, regardless of the diet that they are on, people [get] about the same amount of protein.

Most variable is [usually] the amount of carbohydrate vs fat, to the extent that most people still believe—for unclear reasons—that fat is bad. When [the majority of] calories in the diet come from carbohydrates, that is the worst thing for physiology. Carb calories are the worst thing for the brain, truly the worst thing for the endocrine system, and absolutely the worst thing for the heart. A diet based on calories from carbohydrates ultimately tends to cause changes where protein binds to sugars, and that dramatically increases the production of inflammatory chemicals, as well as free radicals.

The best diet focuses on good fats. There are certainly plenty of bad fats out there—hydrogenated fats and trans fats—and I am surely not referring to them. Good fats from eating olive oil, avocados, nuts, seeds, fish, grass-fed beef, goat's cheese, and fish oils are fundamental for health, while carb-derived calories as one might get from things like bread, pasta, potatoes, below-ground vegetables, fruit, and fruit juices are really things that you want to do your very best to avoid for a brain-healthy diet.

Advances: When you discuss this, are people surprised?

Dr Perlmutter: Yes, virtually across the board. But when I present this material, every sentence and every point is supported by documentation and the perigee of literature. When I make a statement that [to control] overall for markers of inflammation and free-radical-mediated stress, the best diet is high-fat, low-glycemic-index, and low-carbohydrate. I back that up with [literature from] journals like the *Journal of the American Medical Association* as well as the *New England Journal of Medicine*, where these articles have been coming out over the past several years, absolutely overthrowing the notion that a low-fat diet is healthful.

Advances: You've have talked about high C-reactive protein levels giving us a warning about inflammation. How does this happen?

Dr Perlmutter: C-reactive protein is just one of many markers that we use to assess the level of inflammation in an individual. It happens to be a protein, as you might guess. It is manufactured in the liver and responds to chemical signals that come from white blood cells and from fat cells. The activation of C-reactive protein actually has a lot to do with the number of fat cells and things that stimulate inflammation.

The reason we use it as a mark of inflammation is because studies have demonstrated for many years that elevation of C-reactive protein is clearly correlated with coronary artery disease, but we now are seeing many studies come out that demonstrate a direct relationship between C-reactive protein and Alzheimer's risk. This is very important. Again it tends to solidify the contention that Alzheimer's is primarily an inflammatory disorder.

Advances: Is it worthwhile for people with genetic predisposition for Alzheimer's to have certain tests done, since there are steps people can take to reduce inflammation in the brain now?

Dr Perlmutter: Without a doubt, but to take that back just a little bit, we are all predisposed to getting Alzheimer's to some degree and, in fact, if you live to be age 85, your risk of Alzheimer's is 50–50. So that said, this is virtually universal information. We generalize it because inflammation is the underpinning for all degenerative conditions, including diabetes and atherosclerosis and coronary heart disease. These

are the same principles. An anti-inflammatory diet and lifestyle are fundamentally important for absolutely everybody.

Advances: Are there other markers besides the C-reactive protein level that you might have people look for?

Dr Perlmutter: Absolutely. One of the things that we really need to do our very best to avoid is becoming what is called *insulin-resistant*. That means that the body's insulin is no longer as effective in packing blood sugar away; therefore an excess of insulin exists because the pancreas is trying its best to get rid of the excess blood sugar. The problem is that insulin also has the role of increasing body fat and decreasing our ability to get rid of body fat. It very nicely ties together the reason why higher-carbohydrate diets, which raise blood sugar, are related to body fat. High-fat diets are related to decreasing body fat.

Long before fasting glucose goes up, the fasting insulin level rises as the pancreas tries to respond to the higher levels of carbohydrate in the diet. So fasting insulin is a very important marker. There is also a laboratory study called hemoglobin A1c, which is a marker [measuring the] change of a specific protein, in this case hemoglobin as it relates to its exposure to blood sugar. The hemoglobin A1c gives us an idea of, not what the blood sugar is from moment to moment, but rather what the blood sugar has been as an average over the preceding 90 days or so.

Advances: What is your opinion about the way Alzheimer's patients are being treated now with medications like Aricept and Namenda?

Dr Perlmutter: The biggest concern that I have is that neither of those is a treatment for Alzheimer's disease. I could probably leave it at that. These medications have been developed to be symptom-focused. In other words, they help reduce the symptoms of the disease and as a matter of fact, have very little effect in modulating or affecting the symptoms of the disease.

It turns out that Aricept, which is what we call a *cholinesterase inhibitor*, was designed to allow the brain to have more of a chemical called acetylcholine. It was found that acetylcholine is deficient in the Alzheimer's brain, so they developed a drug to increase that chemical. It turns out that in a review by the *British Medical Journal*, looking at every double-blind, placebo-controlled trial of acetylcholinesterase inhibitors that they were ineffective. Our most well-respected, mainstream publications indicate that this type of mentality is ineffective for treating Alzheimer's disease.

The second drug you mentioned is called *memantine*, Namenda being the trade name. In 2010, this drug produced about $1.2 billion (USD) in revenues for its manufacturer. The trials that indicate effectiveness for memantine, which is made by Eli Lilly, now indicate that for mild to moderate Alzheimer's disease, it does not work at all. This information was recently published in the journal *Lancet*, which I think we would all agree is a very well-respected journal.

One interesting quote comes from Lon Schneider, MD, MS, at the University of Southern California, writing in the journal *Archives of Neurology*—one of our most well-respected journals that is published by the American Medical Association. He says that using this drug, since it does not work, is really off-label, because it is not indicated for the treatment of mild to moderate Alzheimer's disease. I quote: "Despite its frequent off-label use, evidence is lacking for benefit of memantine in mild Alzheimer's disease."

If there were a meaningful pharmaceutical intervention for this disease, that affects 5.5 million Americans and costs us about $150 billion a year, I would be all over it. Unfortunately that doesn't exist.

But we do have the opportunity to close the barn door before the cow gets out, or as John Kennedy said, "The time to fix the roof is when the sun is shining." We can be very preemptive and preventive in terms of designing programs that reduce a person's risk for Alzheimer's. That said, it gets back to our earlier discussion relating Alzheimer's to blood sugar: It turns out that if you become diabetic, you immediately double your risk for this disease.

As mentioned, this is a disease which you have a 50–50 chance of developing anyway if you live to be age 85. When you're diabetic, you double that risk. That is just being diabetic and becoming a type 2 diabetic is a choice, not an inheritance issue. It doesn't just happen. It's a choice a person makes based on his or her diet. The more carbohydrates in your diet, the more likely you are to become diabetic, at which point you have created a scenario where you are more than likely going to become an Alzheimer's patient. It's a preventable disease.

Advances: What about the dramatic increase of diabetes in the United States that we're currently witnessing? That seems like a concern in terms of potential Alzheimer's disease increase.

Dr Perlmutter: It is absolutely a concern. Some statistics indicate that the risk of becoming a type 2 diabetic in America is now 85%, lifelong. It is a huge risk, in and of itself, for the complications of diabetes, but when you look at it in terms of what it is doing to Alzheimer's risk, it is profound.

Advances: Vascular dementia is different than Alzheimer's? Should it be treated differently?

Dr Perlmutter: In some small ways it can be treated differently, but at the root of vascular dementia are the same modifiable factors that relate to Alzheimer's disease: free-radical-mediated stress and inflammation. With vascular dementia, however, we often times see elevation of a particular marker called *homocysteine*. Homocysteine relates very strongly to the risk of having small strokes in the brain but, again, there is a strong relationship to being diabetic as well. Our treatment protocol for Alzheimer's and vascular demen-

tia are fairly similar but with a patient demonstrating a vascular dementia, will often utilize a treatment called hyperbaric oxygen therapy. This is a technique where patients are placed in a chamber that's pressurized with 100% oxygen. We know that has a powerful effect on improving blood supply to the brain. These patients are scrutinized for blood pressure. Their diets are scrutinized, and often times, we use an herb [compound] derived from the periwinkle plant called *vinpocetine*, which also tends to improve the blood supply to the brain.

Advances: What is the history of the hyperbaric pressure treatment? In other words, how did you begin?

Dr Perlmutter: Hyperbaric has been used for a variety of medical issues in this country since the 1940s and has proven its merit. Its use in vascular diseases is now global and in Asia and parts of Europe, including Germany, they are far more aggressive in treating vascular disease in the brain than we are in the United States.

I've been directing a hyperbaric center for the past 14 years, and we've had great success in dealing with a variety of neurological problems including stroke patients and vascular dementia, multiple sclerosis, and cerebral palsy in employing this therapy. It turns on the genes to reduce free-radical production, oxygenates the brain and improves the blood supply to the brain, and increases the growth of new blood vessels. It's a very, very powerful technique.

Advances: In addition to reducing the risk of Alzheimer's, do you think it is possible to repair the brain after damage or even regrow brain cells?

Dr Perlmutter: It is not a question of whether I believe it or not—it is mainstream science. It is well-accepted and, oddly enough, the notion that the human brain can regenerate itself was looked upon as being almost blasphemous until the epic research published in the journal *Nature* in 1998, where researchers were able to demonstrate the fact that humans, indeed, do grow new brain cells throughout their lifetimes—a process called *neurogenesis*.

Neurogenesis is under the influence of a specific growth hormone of the brain, which goes by the initials BDNF (brain-derived neurotrophic factor). What is so powerful is that we know how to control the genes to turn on the production of BDNF. In other words, we know how to turn on the genes that can allow a person to grow new brain cells—and those factors that turn on the genes to grow new brain cells are: physical exercise, the nutritional supplement DHA, and calorie restriction.

An amazing article was published in the proceedings of the National Academy of Science in April of 2010 that demonstrated in MRI-studies that individuals who exercised grew bigger memory centers had higher levels of BDNF in their blood stream and demonstrated improvement in memory, whereas the group who just did stretching for the 1-year period of time had a progressive decline in memory function, shrinkage of their hippocampus, and lower levels of BDNF. [The difference] is just physical exercise.

That is more powerful than any pharmaceutical agent that has ever been developed, and frankly, who's heard about it?

Advances: Nobody.

Dr Perlmutter: It's pretty breathtaking. I actually have written several articles, one for the *Huffington Post*, about the whole concept of neurogenesis. This was one of the key focal points of my last book, which is called *Power Up Your Brain, The Neuroscience Of Enlightenment*. We have this opportunity to, basically, grow a new brain.

Advances: You have said neuroplasticity is the link between contemplative practices and enlightenment. In your life, are meditation and spirituality important, and do you think it can affect brain health and well-being?

Dr Perlmutter: The answer to the first question is "absolutely," and the answer to the second question is: Those two things are mutually conducive. Health and well-being enhance the ability of the meditative process to work and the meditative process obviously feeds back and helps our health and well-being. There are structures in the brain that are involved with meditation—for example, the prefrontal cortex.

We access this area of the brain through another brain structure called the anterior cingulate, but the connection of the anterior cingulate to the prefrontal cortex can be enhanced. When you practice something, you enhance connections. It's called *neuroplasticity*. That is how we learn to swing a golf club or we learn a language or we learn how to chant a mantra. That is how these connections are made, but we can enhance our brain's ability to perform neuroplasticity. We can enhance the way those cells connect to each other by turning on that same gene pathway that grows new brain cells, called *BDNF*.

BDNF does three things. It turns on neurogenesis, the growth of new brain cells; it allows brain cells to connect, and it also protects brain cells so that they are able to survive various insults and trauma. We really need to do everything that we possibly can to enhance BDNF availability to the brain. With respect to neuroplasticity, therefore, when a person is involved in prayer or meditation, it allows the process of connection to happen between the prefrontal cortex and the anterior cingulate. Because of this you are able to make that connection stick. You are able to [additionally] formalize or solidify that connection by taking things like DHA and performing aerobic exercise and focusing on a diet that reduces both carbohydrates and calories.

Advances: You've talked about reinforcing neuropathways for the positive instead of the negative and how that can

affect the brain. Could you discuss that, please?

Dr Perlmutter: We really choose the brain that we will have, and the brain is going to incorporate our life experiences. That is what the brain does—what learning is all about. When we choose to expose ourselves to negative life experiences, we then build a brain that is more responsive, more reactive, and more involved in how we experience the world from a negative perspective. Watch the evening news, read negative things in the newspaper, choose to read and participate in things that are negative, and you'll build a brain that is a perfect receptacle for negativity.

Obviously the flip side is that when you engage in positive actions of compassion and empathy and becoming socially aware and doing the right thing, then you build a brain that sees the world through that color of glasses. Your experience remains positive and that continues to feed back to your brain, building an ever-more-positive brain and an ever-more-positive outlook.

Advances: This is really a science perspective, not just an opinion?

Dr Perlmutter: Without a doubt, this is mainstream medicine. There is a wonderful book, called *How God Can Change Your Brain*, by Andrew Newberg, and this book has absolutely nothing to do with religion, but it simply focuses upon the effect of positivity—the effect of meditation on physically, structurally, and functionally changing the human brain.

It is very, very powerful. I think we are getting to a wonderful time when we can actually use leading-edge neuroscience to demonstrate that what the great teachers of the past have told us really has a profound and meaningful scientific underpinning.

You know, it's all well and good when we are told things by the Dalai Lama, who says that "The brain we develop reflects the life we lead," meaning that our choices in life will be embossed upon our brain and change our brain in a structural functional way. It's breathtaking that the Dalai Lama will say that.

But when you look at researchers like Michael Merzenich, PhD, who has done research that demonstrates that there are structural, physical changes in the brain that take place with repeated activity and you can image those. You can do high-end, current, leading-edge imaging studies to demonstrate those changes. It's very breathtaking and for a person like myself who is, at his core basically a scientist, to have that validation. I think it's really wonderful.

Mahatma Gandhi said that "We are the product of what we think. What we think, we become." My point is we choose what we focus on. We choose the direction of our thoughts. We want to have a brain that lives in an environment of low inflammation and we want to understand the individual in terms of his or her predispositions or sensitivities in life that may increase inflammation, therefore create a milieu or an environment where that brain is less functional.

One of the things that we are really focused on these days is something called *gluten sensitivity*. This is hugely front and center with a variety of books coming out talking about how gluten sensitivity can affect this or that. It turns out that one of the key target organs of inflammation in a person who is gluten sensitive is the brain, and that is the focus of my new book, which is called *Grain Brain* (Little Brown, September 2013).

The response, even to the preliminary information that we are putting out about *Grain Brain,* has been global. People are interested in this because the whole notion that gluten sensitivity might be something important if you are a professional tennis player or if you have gastrointestinal issues is interesting, but the fact of the matter is, the brain is a huge primary target. It's a powerfully affected, primary target for gluten sensitivity. Inflammation is a key player and gluten sensitivity in humans is very, very important.

Advances: That would include neurological patients in addition to everyone who is worried about reducing inflammation?

Dr Perlmutter: Absolutely, 100%. This idea is so front-and-center—the importance of identifying individuals who are gluten sensitive and putting them on a gluten-free diet, as well as recognizing that a high-carbohydrate diet is the worst thing for the preservation and even the enhancement of human brain health. It's time to rewrite the rules based upon our current, best science.

Advances: Can you describe what your facility, the Perlmutter Health Center, provides patients and why it is a unique resource?

Dr Perlmutter: We practice functional medicine, which is a way of looking at health, maintenance of health, and even treating disease by looking not just at what disease the person has, but who is the person who has this disease—number one. Number two—why may they have gotten that disease in the first place? What is unique about that person which brought them there? Or, what can we do in that individual who is healthy to identify risk patterns and be preemptive to keep that person healthy—lifelong? That is the focus of our health center.

We deal to a great extent with nutrition. We have a dietitian on board. We do a lot of unique laboratory studies that are far beyond what you might get under standard allopathic medicine, which is really focused on what's going wrong, and not really attuned to what your health parameters are now and what preemptive measures can address those issues long before disease has manifested? We're involved with that. We do a lot of nutritional supplementation work.

We do intravenous work to get people back to where they need to be from a nutritional perspective. We have been utilizing an intravenous substance called *glutathione*. In America, we have pioneered the use of this in the treatment of various neurological conditions. Beyond that, we have one

of the largest hyperbaric centers on the planet, utilizing this very, very powerful therapy for a variety of neurological problems.

Advances: Do you treat many neurological diseases?

Dr Perlmutter: We treat any number of diseases that have, oftentimes, nothing to do with the brain. As unusual as that might sound, many patients I see are for skin disorders, gastrointestinal disorders, cardiovascular disorders, diabetes, and cancer, because all of these perturbations of human health have a common origin when it comes to looking at a person's nutrition.

How unusual it is that we have come to a place where talking about the role of nutrition in illness is looked upon as being unique. Are you getting how incredible it is that we're having this conversation? If people say, "There are practices that do what we do but that's really nontraditional medicine," I would respond: "Look up the definition of *traditional*."

The definition of traditional has to do with what's been practiced the longest and is accepted globally as the most tried-and-true way of approaching a problem. That is [what constitutes] a traditional approach and I would indicate that what we're doing is, in the history of the planet, absolutely traditional. What is happening these days, in mainstream allopathic medicine, is absolutely nontraditional.

Our focus is called *functional medicine*. There is now a big push for people to understand what functional medicine is—a very well-organized discipline attempting to codify what it is that we integrative, alternative, holistic practitioners are doing, but to give it hard, scientific underpinning. There is much interest in functional medicine. I would say that the antithesis, then, of functional medicine [when contrasting it with] mainstream medicine would be dysfunctional medicine.

That's a little bit aggressive, though. I think that we really have to step back and understand that mainstream, allopathic medicine has wonderful things to offer in the overall health care plan, but it is a little bit myopic in terms of being only focused on treating illness when we really need to keep people healthy. That's what is more important for us as doctors. But even if you want to reduce it to health care dollars, [prevention] is the best bang for the buck.

Advances: Do you think perceptions about using nutritional improvement as a way to prevent diseases of the brain are changing and people are becoming open to this idea?

Dr Perlmutter: I think because media in the world these days, more and more people, globally, are recognizing the role of nutrition and health and, to some degree, understanding that the foods that you eat have an impact on the health of your brain. Yes, I see that it is changing, albeit painfully slowly.