ADDICTION SUMMIT

Neurology of Brain Inflammation and Addiction
Guest: David Perlmutter

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Dr. Paul: Welcome to this edition of the addiction summit. I am Dr. Paul, your host. I am delighted to introduce to you one of my heroes, Dr. David Perlmutter. He was instrumental in changing my life when he came out with this book, *Grain Brain.* And I read it, underlined it and tried to implement a lot of what was in that book.

So I am one of you. I have been challenged with numerous addictions in my life. I was addicted to others' approval. As a young man I got addicted to cigarettes. I got addicted to alcohol. Thankfully most of that is behind me. For a long time I struggled with grains, with food.

And so your book, Dr. Perlmutter, really helped me a lot, as I was able to get grain out of my life, drop about 20 to 30 pounds and what my kids used to call my papa belly. And that has really helped me on my journey.

You also now have this other best seller, *Brain Maker*, which really excites me, because of the power of gut microbes to heal and protect your brain for life. That is going to be something I am hoping we will touch on in good measure during this summit. So I want to welcome you to the addiction summit. Thank you for joining us.

Dr. Perlmutter: Well thank you, Dr. Paul. I think I would like to open by saying before we went live or recorded, that you asked me if I have any

addiction stories that I would like to share. And I told you that I didn't, because in thinking it through, I don't have any.

But then when you mentioned in your opening addicted to others' approval, I think a lot of us have, I don't know if it is an addiction, but that is something as you mentioned that I was thinking about. We know a lot of us needed approval growing up and motivated ourselves to do what we did and continue to do to some degree.

I don't know, again, if it is an addiction, but being satisfied to some degree—so perhaps it is an addiction—by getting the approval of others. Specifically, paternalistic or maternalistic influences, I think, are very valid in that discussion.

Dr. Paul: Yea, absolutely. So you are a neurologist. So you are a brain expert. You are also a very successful author, with at least those 2 best sellers. I imagine that you have other books that I am even not familiar with. You are a researcher. You are an educator. You publish.

Tell us a little bit, for your viewers who don't know you, your journey in medicine and how you came to—what I would say I ended up evolving into integrative and functional medicine. And I think you have probably done something similar, from what we were taught in medical school, which was diagnose and treat. Perhaps share a little bit of your journey and how it hasled you to where you are today.

Dr. Perlmutter: Well I would be happy to. You know, truthfully, I have been asked that question before and so I have had plenty of time to think about it. And I would say that, interestingly, there was a time in my career as a neurologist when I finally felt dissatisfied with our inability to really help people. And that was the epiphany.

But really in thinking it through, I think I have always been an outlier. I know even in medical school I was an outlier. Back in those days we were looking at fish oil, for example, for heart disease and nutrition. And I was very disappointed in medical school at one point, because we had no nutrition. And yet I was aware of a friend in veterinary school who was getting a year's worth of nutrition, because it mattered for your dog, but it didn't matter for you.

That said, again, I have always been a bit of an outlier and to some degree a bio-hacker as well. In other words, really doing things with respect to my own health and my own body that I thought were reasonable and important based upon things that I had discovered. And that is what I carried through medical school, through my neurology residency and really into my practice.

I did complete residency in neurology. I went into private practice of neurology. And really did mainstream neurology for a decade. I went to the hospital in the middle of the night and treated strokes. I had a full office going as well with two other partners.

And towards the end of that 10-year period of time, I really became acutely aware of the fact that we were practicing under the premise of diagnose and adios. Meaning we could name your problem really well, but what we had to offer was minimal. And I was not satisfied with that.

I really began to embrace the idea of keeping people healthy—who knew, a doctor. In the years later, as we have been laboring in Washington over the health care plans, etc., just as a quick roll forward, these plans and insurance, etc., have nothing to do with health. They are all based on dealing with people with illness, whether physical or mental.

With that said, going back to my epiphany, really wanting to keep people healthy from a neurological, a brain perspective, in those days, we are talking 21 or 22 years ago or longer, even the idea of being on a heart smart diet back then was kind of out there. Basically, it was be a good patient, take your cholesterol drugs, and hope for the best.

So it wasn't for the lack of peer-reviewed science that was published, indicating that exercise, dietary intervention, better sleep are salubrious in terms of the brain. That was out there. But no one was talking about it. And I began to review that literature and then began to attend integrative medicine meetings, functional medicine meetings and began to connect with these people who were doing this work.

Ultimately, because I spoke up at a few of these meetings and raised my hand and said, "As a matter of fact, certain journals, etc., are talking about this stuff, I got invited to speak to some of these venues and then ultimately became really part of that whole counterculture, if you will, with these doctors who are involved with alternative, integrative, complementary, functional medicine. You can call it what you will.

Dr. Paul: Yea.

Dr. Perlmutter: At that point, I realized it had a lot of traction. And I began integrating that knowledge base into my day-to-day neurology practice. And I ultimately found that it was clear that that was in contrast with what was going on in my office in terms of my other partners.

So we parted ways amicably. And I built a center and really then began to explore in great depth the clinical application of these lifestyle ideas. I began to realize that a high carbohydrate, high sugar diet was bad for the brain. And gluten led to inflammation. It is bad for the brain in terms of inflammation being the cornerstone of various things that you don't want to get: Alzheimer's, Parkinson's, MS, autism, depression and inflammatory disorders.

So I began to look at the influence of diet on inflammation. And that was the ideology behind *Grain Brain*. And then I looked at the influence of diet through the lens of the gut bacteria, which was a very burgeoning, nascent area to look at back in those days. That book was written several years ago as well.

And I realized that, yeah, it is great to look at fat, carbohydrate, protein and the micronutrients in the diet in terms of their direct effects on our physiology. But when we look at these components, others like fiber, on how they influence the gut bacteria and then how the gut bacteria influence our health, this was a brand-new area of excitement for me. It was a brand-new area of excitement and exploration for the whole scientific community.

And I think now we are seeing a virtual explosion of data and research really looking into the gut bacteria, their metabolic products, their DNA, their RNA, their signatures. How do our lifestyle choices affect diversity of species that live within us, their activity? So, it is a very exciting time.

And where has this quest taken me? Certainly, well away from the brain, now to the gut and to the notion of the gut/brain connection. I think this is very exciting, because as mentioned, it opens a lot of new doors. It is filled with empowerment, because we now have an understanding of how changes in the gut can affect the brain and mood.

But is also an area that when we discuss it and implement its ideas, we are filled with responsibility. That is because now our food choices are relevant in terms of 100 trillion organisms, not just ourselves, and how those 100 trillion organisms then feed back to our health.

Dr. Paul: Yes. Wow. That was a great summary. Folks, what you hopefully heard there was keeping people healthy. And then we are going to touch on this gut/brain thing. That is what this summit is about. That is what my book, the *Addiction Spectrum*, is about.

David, in my book, I outline sort of the things you have already touched on, which is what you eat, getting your nutrients. Vitamin D is needed. Reducing stress has a lot to do with brain. Sleep, exercise and the biome and you are

my biome expert for this summit. So this is a perfect segue into just digging a little deeper.

In your book, *Brain Maker*, you report that 26 percent of U. S. folks have mental health disorders and 40 million have anxiety. Ten percent are on medication for their mood problems. Ten percent have depression. And death rates, you are dying 25 years earlier if you are addicted to tobacco, alcohol, food, being overweight.

This crisis is actually of our own doing to a certain extent. Now there is a behavioral component to addiction. That is not what we are going to focus on today with our talk. We are going to focus, hopefully, on what we can do, if you are watching this summit. What do you say to someone about fixing that gut so they can fix and heal the brain?

Dr. Perlmutter: Well there is a lot to talk about. We will cover various points. I would like to cover the notion that our gut bacteria are our friends. Interestingly, this morning, I got in the mail this interesting book. And this is actually *Brain Maker* in Brazilian Portuguese. I don't speak Portuguese, but it says *Amigos da Mente*. And I think that means "friends of thinking."

Dr. Paul: Yea, friends of the mind or friends of the brain. Awesome.

Dr. Perlmutter: So again, this is where we are going. The care and feeding of our microbiome, I think, is maybe what we could entitle our time together today.

Dr. Paul: Yes.

Dr. Perlmutter: And it is of vital importance not only in terms of the brain from a mood perspective, but a cognitive perspective as well, a day to day functionality perspective, i.e., cognition and memory. But also long term risks for degeneration and other types of diseases, I think are relevant, viz a viz, the health of our gut bacteria.

Dr. Paul: Yep.

Dr. Perlmutter: I want to get back to just framing this again, because you and I are having a discussion along with your viewers of caring for the brain by caring for the gut, and specifically caring for those little critters that live within us.

You know, a few years ago, we would not have had this conversation, because the underpinning from a scientific perspective would not have been there. But it is there now.

Dr. Paul: Yes.

Dr. Perlmutter: What we are looking for is to keep our gut bacteria healthy. And while we could have a discussion about what are our definitive endpoints in terms of making that decision that the gut is healthy or not, that's a very difficult decision and discussion to have, because it is as yet undefined.

Because we don't know how a specific array of organisms would benefit you versus me or would benefit you based on your genome, your DNA from your parents and ancestors versus mine, where you live, other influences in your life. So that is still undefined.

But what we do know is that one simple parameter in looking at the gut bacteria that seems to be relevant across the spectrum of health versus disease, that dichotomy is, in a word, diversity. We recognize that the more instruments are in the orchestra, the better the symphony is going to sound.

Dr. Paul: Lovely analogy.

Dr. Perlmutter: We first want to ask ourselves, in our modern society, what is it that is leading to this real compromise of gut bacterial diversity, which is very, very evident. Modern cosmopolitan society is characterized by a marked reduction in the diversity of species that live within the gut as contrasted to both rural or societies that are still living in non-Westernized areas and also in comparison to less modern societies, in other words our ancestors.

In fact, we are able to characterize the gut bacteria and the diversity of bacteria from our ancestors. We have technology that looks at the genetic signature found in fossilized fecal material from thousands of years ago. We call that material coprolites. And we can describe the diversity of our ancestors by looking at this genetic signature. And it is quite diverse.

Also, we can look at Otzi the iceman. He was found from thousands of years ago in northern Italy. We actually hiked almost to where he was found last year. And his microbiota, at least their genetics were preserved. And he also had a large diversity of organisms. That is what we are lacking today in modern cosmopolitan society. And that is what I think is very much responsible for changing our immune regulation and amping up inflammation in the human body.

So, what is it, then, that we are doing to ourselves that is threatening this key parameter, diversity, today? And there are many things. Our diets, I think, are going to have to be on the top of the list. The one thing that I think that threatens our gut bacteria to the most significant degree is our lack of fiber in

the human diet and specifically a type of fiber that nurtures the gut bacteria called prebiotic fiber.

That is the type of fiber that is found in various vegetables, jicama, which is Mexican yam, garlic, onions, leaks, dandelion greens, chicory root, for example. These are all foods very rich in prebiotic fiber. You can go to the health food store and say, "I would like some prebiotic fiber." And they will find you some prebiotic fiber that is made from acacia gum.

That is a tree in Africa that secretes a gum. It is made into an organic product that is sustainably harvested and can give you a very simple way of adding a tablespoon to whatever you drink in the morning and getting more prebiotic fiber. So, we want to nurture our gut bacteria with lots of prebiotic fiber, low amounts of sugars and certainly healthful fat. We want to have good levels of good fat in the diet.

The next point would be, what is it that is challenging our gut bacteria and leading to this diversity beyond our diets? And that would be a lot of things. Certainly, on the list would be medications. We know that here in America, we are using way more antibiotics than are necessary, according to our own CDC. They recognized that 70% of the antibiotics produced and utilized in America are actually going into our cattle and our poultry, which we then consume.

We recognize that there is profound over-usage in the treatment of things like upper respiratory infections, which are by and large viral, ear infections, which are by and large viral. In other words, antibiotics are irrelevant. In fact, recognizing that we should practice medicine under the dictum of above all do no harm, we have now got to understand that antibiotics do a lot of harm and it is long term.

One study recently demonstrated that even one course of antibiotics will alter the gut bacteria for the rest of an individual's life. So that is very important information. We recognize that antibiotics are profoundly associated with an increased risk for type 2 diabetes. And that in and of itself dramatically increases the risk for things like Alzheimer's, as much as quadrupling that risk, coronary artery disease and other things like vascular disease and cancer.

So, it is not a free ride to be giving out antibiotics like candy. Now that we look at the potential downsides of antibiotics, beyond creating antibiotic-resistant organisms, through the lens of our gut bacteria, how antibiotics may be affecting that, we understand that it is very, very important to consider these downsides because of their long-term risks.

One study that was published about 3 weeks ago indicated a dramatic increased risk in allergic and immune-related issues in children who received either antibiotics or acid-blocking drugs during their first 6 months of life. And this was a study that looked at, I think, 70,000 medical records of children born to military families. So they had really good record keeping.

And it takes us to the notion that these acid-blocking drugs are also relevant in terms of the gut. We know that when you change the pH of the intestine by taking drugs that block stomach acid, you are going to create a situation where certain other organisms might find that environment better, whereas others might not survive because the pH has been damaged.

And that said, one study was published last year in the Journal of the American Medical Association, a specialty journal called *Neurology*, last year. Demonstrated a profound increased risk of dementia in people who were using not proton-pump inhibitors but another intervention that has an effect on the gut bacteria and that is artificial sweeteners. Who knew?

This was a study demonstrating that artificial sweeteners are associated with an increased risk of dementia, a situation for which we have no treatment. So alterations of the gut bacteria can have profound and lasting effects on the brain, on mood, on things like depression. I talked about it in *Brain Maker*. And we understand that depression is primarily an inflammatory disorder.

So there is a lot of work being done looking at how changes in gut bacteria might affect mood, for example. So when we see, for example, a study published in the journal, *Stroke*, that looked at risks, again, for dementia and even for stroke in people taking acid blocking drugs, again changing the pH of the gut. And we see an increased risk of Alzheimer's disease, specifically a 3-fold increase, as well as increased risk for stroke.

We have to pay attention to the mechanisms that underlie how these studies are explained. And the mechanism that is really on the top of the list is not that there's a direct toxic effect of the artificial sweeteners or the proton pump inhibiting, acid-blocking drugs or antibiotics but that these effects are translated through changes in the gut bacteria.

So it is a very, very exciting time and it really speaks to us as doctors. The word doctor in Latin means teacher. It really speaks to us to get out there and really get the message out to as many people as are going to listen that the food we eat really matters, because it affects our gut bacteria. The drugs we take really matter. The water we drink, whether it contains chlorine or not, really matters.

The amount of exercise we get matters as well. There's two new studies recently demonstrating a strong correlation between level of cardio-respiratory fitness and key metric diversity of gut bacteria. So exercise is important as well. We know that sleep and, more importantly, lack of restorative sleep has a role in terms of gut bacteria.

And finally, stress is very important. The higher levels of stress that we experience, the more changes are induced in the gut bacteria and the more leakiness of lining of the gut is induced. When we have higher levels of stress, our bodies produce higher levels of something from the adrenal glands called cortisol. And cortisol changes the array of bacteria and other organisms in the gut.

That leads to overgrowth of some types of organisms called yeasts and also, in part, higher levels of leakiness of the gut. And that is the focal point, the cornerstone of increasing inflammation in the human body. And again, inflammation is the cornerstone of mostly every degenerative condition that you don't want to get. So, that is a really why paying attention to our gut bacteria is so very, very important.

Dr. Paul: Wow! You just summarized the keys to becoming healthy again. So you are watching this summit and you are going, "What does this have to do with my addiction?" Believe it or not, everything, because addiction is just the brain on fire. It is the exact same thing, gut/brain.

How many of us, when we are in the middle of our struggle, feel anxious, feel low energy, feel depressed, feel hopeless? Those are not just little emotions. Those are your brain in trouble.

And you are a neurologist and yet you are getting it right to practical steps of what we eat, avoiding antibiotics, getting the nutrients you need, avoiding those artificial sweeteners. That was excellent. And then getting exercise, the sleep and all these things you touched on. I could not have said it better myself.

So, if you are watching this and you wonder, "What I do practically do?" You have already touched on all the broad areas. Most of us, I think, who are struggling with any kind of chronic health issue, and addiction is a chronic health issue with sub-layers of anxiety, depression and all sorts of things, we probably have messed up our biome.

I know most of us have had too many antibiotics. A lot of us use artificial sweeteners. We are drinking water with chlorine, which is not good for our gut bacteria. A lot of the food, you might touch on perhaps the GMO issue,

because I know that has a lot to do with the gut, I think, when you are eating foods that have been processed with pesticides, herbicides, glyphosate, that sort of stuff. Not a big part of this topic, but just one other thing that messes up that gut, right?

Dr. Perlmutter: I don't think we should gloss over that. I believe that is actually very, very important when we recognize that over 95% of the corn and 90% of the soy in America and a lot of the wheat is treated with that chemical that you mentioned, glyphosate. By and large, that is why our food is genetically modified, with the exception of wheat.

The GMO issue is that the food is modified, the plant is modified in such a way, the seeds are modified, so that farmers can then spray their crops with this poison and kill the weeds but not damage the corn. So the argument about GMO is not that there is necessarily, although there could be, I think there might be an issue with the food itself being genetically modified.

But the reason it was GMO in the first place is to allow farmers to spray that food that you then eat, to spray that food with Roundup. And the active ingredient in Roundup is called glyphosate. And a lot of research has indicated the glyphosate is damaging to, you guessed it, the gut bacteria.

A wonderful series of articles was published by Dr. Stephanie Seneff at MIT. I have actually interviewed her. They indicate the pervasiveness of this practice and its effect upon changing the gut bacteria. So it is a very relevant discussion in terms of all of the manifestations of a disorder of the gut bacteria that we have just gone through.

That is the reason we really call upon your viewers today to vote with their wallets and choose non-GMO foods. You read countless articles online of people saying, "Yeah, we need GMO because it is safe and it is going to feed the world."

Well, okay, again let's get away from the argument for the moment about GMO being safe or not safe. Let's get back to why food is genetically modified in the first place, by and large, to open the door to allow the food to be sprayed with poison. That is the issue that we need to really address. That poison changes your gut bacteria and as such opens the door for you in terms for risks for some very nasty issues that you don't want to get.

So, I think that is actually very germane. And beyond that, I think the notion of our foods in direct relationship to our ability to move through addiction is a very important area to explore. Because basically what every treatment for

addiction is attempting to do is to allow people to connect to a non-addicted part of the brain.

The vicious cycle, the merry-go-round, the carousel that people cannot get off when addicted is really brain circuitry. It is really stimulating a certain part of the brain, an addiction center, if you will, with a certain addictive chemical, dopamine, if you will, that continues to satisfy that area of the brain. And we ultimately require that level of satisfaction. We can't get off the merry-go-round. And that really defines addiction.

It is targeting that circuitry that is the focal point of really any therapeutic intervention, whether it is pharmacological or behavioral. That is trying to get people away from that circuitry, this constant bombardment of that dopamine receptor to satisfy—which never truly can be satisfied—that addiction. This is whether it is a food addiction, a behavioral addiction or a pharmaceutical addiction.

So I think that what we are looking for is distancing ourselves from that pathway, while at the same time engaging another pathway, a non-addictive pathway, that can serve to divert that individual away from the addiction pathway. So that generally is thought to represent connecting to other parts of the brain, to be more rational about behavior and make appropriate decisions that don't cater to the addiction.

So what we are talking about here is developing a new pathway, strengthening this pathway and ultimately allowing this pathway to overtake the addiction pathway and allow individuals to make more appropriate decisions. And this is a pathway that probably uses a different chemical mediator, called serotonin. And probably it is involved in a different brain area, more likely stimulating an area of the brain called the prefrontal cortex that allows us to finally make rational decisions, to make decisions that involve our understanding of what the future holds in terms of those decisions, what are the consequences of our decisions.

And also, and I think very importantly, it allows us to more fully experience the concept of empathy, to be able to see the world through another person's eyes and really experience what another individual may feel. But also, relating back to ourselves, how we may feel and really catering to ourselves in the long run as well. So on the one hand, we are trying to distance our connection to the addiction pathway, while at the same time strengthen our connection through brain areas called the anterior cingulate cortex, to the area of the brain, the prefrontal cortex, which really defines us as human beings.

So how do we do that? And how do lifestyle choices make the behavioral therapy, the pharmaceutical therapy, etc., stick or become more effective? We do this through a concept called neuroplasticity. And what does that mean? It means the ability of the brain to rewire itself.

Back in our day in medical school, we didn't talk about that. We didn't talk about the idea that the brain can grow new brain cells, neurogenesis, nor could the brain rewire itself. And yet it does.

Dr. Paul: Even at our age. Right?

Dr. Perlmutter: Accept it as dogma. We understand that. So the real question would be, how do our lifestyle choices affect the ability of the brain to distance itself from one pathway and augment our connection to another more positive pathway, if you will? And so how can we enhance this process of synaptogenesis and synaptic plasticity, neuroplasticity?

We do so by engaging our DNA. We change our life code. Yow! Did I just say that? You bet. We change the expression of our DNA which is another thing that you and I were not taught.

We actually target our DNA to produce more of a chemical that goes by the initials BDNF, brain-derived neurotrophic factor. And in so doing, that is the chemical, the growth hormone if you will, that allows the brain to strengthen its connection to this new and very healthy pathway to the prefrontal cortex.

Dr. Paul: How do we do that?

Dr. Perlmutter: Okay, good. We engage that through many points, bullet points that I will go through right now.

Dr. Paul: Okay.

Dr. Perlmutter: I am looking at a slide mentally. So we want to do everything we can to increase brain-derived neurotrophic factor. Again, why? Because that is the chemical, if you will, the growth factor, that allows us to strengthen our connection to the parts of the brain that enhances our ability to make important changes and to relinquish our addiction.

So, how do we strengthen BDNF? How do we turn on that gene? First and foremost, the most powerful way is aerobic exercise. So the pioneering work done by Dr. Erickson at the University of Pittsburgh and subsequently in a collaborative study with his group and UCLA demonstrated that aerobic exercise powerfully augments BDNF production. It increases the growth of the brain's memory center, called the hippocampus. It improves memory.

And we now understand that depression is strongly affected in a positive way by increase in size of the hippocampus, the brain's memory center. But we want to have a lot of BDNF floating around so that it allows us to reconnect to that area of the brain, our will area, our empathy area, our understanding of our consequences of our actions area, the prefrontal cortex. That is the connection between aerobic exercise and strengthening that connection while we relinquish the addiction connection. Exercise, number 1.

It turns out that being on what is called a ketogenic diet—what does that mean? Ketogenic diet is a diet that favors fat and is remarkably low in carbohydrates. That is brought on by periodic fasting, for example. By the use of certain supplements like MCT oil. When we get away from having the brain burn sugar as a fuel and get the brain to burn fat as a fuel, it is real good for the brain. There are actually several Alzheimer's programs that use now this ketogenic diet as part of their therapeutic protocol.

So when we eat more good fat and get rid of bad fats and get rid of the high levels of carbs and certainly the sugars, our bodies start to make ketones which are wonderful fuels for the brain, number one, and, number two, they increase the production of BDNF. It allows us to reconnect to the part of the brain to make our choices. We know that turmeric, which is an Indian spice, will turn on BDNF. We know that whole coffee fruit concentrate, which is a health food store item, can do it as well.

So these are important ways by which we can enhance the effectiveness of whatever therapeutic protocol we are involved with, whether it is meeting with a counselor on a weekly basis or whatever a person finds to be most effective, going to meetings, etc. But the effectiveness of those programs can be dramatically increased by creating the brain chemistry and the brain connections, the hardwiring of the brain, which we can change, to allow those new ideas to stick.

Now I want to mention one more thing if I could, and that is the importance of this chemical serotonin. The production of serotonin is very much dependent on the health and diversity of our gut bacteria. So again, chemistry of the brain day to day and our ability to make good decisions for our health and away from addiction is to some degree involved with the health of our gut bacteria.

So serotonin is decreased when there is inflammation in the body. There is a pathway that keeps tryptophan, the amino acid that our bodies use to make serotonin. There are two pathways by which tryptophan is metabolized. In one pathway it becomes serotonin and that represents about 5% of its use. Ninety-

five percent of that pathway is shunted on the other side to create something called kynurenic acid.

And kynurenic acid pulls serotonin away. It reduces serotonin. It pulls tryptophan from being available to make serotonin. We favor kynurenic acid production when there is inflammation in the body. So once again, where does it come from? It comes from the gut.

We have to pay very much attention to the gut health as it relates to inflammation, as it relates to the availability of serotonin. And also, we are now seeing evidence that, to some degree, changes in gut bacteria, at least in the rodent model, in the laboratory model, have a role to play in BDNF production, getting back to our connection to that part of the brain the really defines us as being human.

Dr. Paul: Wow. This is so fun. I am a science geek. Some of my viewers are going, "What the heck?" But we now have the neurologist explaining the why of needing to fix our gut. We can change our genetic map, so to speak.

People hear there is a new genetic link to this disease or that disease. Or if you are addicted or my parents were addicted, I am doomed. No. Right? What you are saying is there is the ability to turn on and off genes, the single nucleotide polymorphisms. And just changing your gut can have a profound effect on serotonin, dopamine. This is just revolutionary.

The simple part, I still want us to get back to, though. What can I do to boost my serotonin? How do I change my microbiome? Practical steps.

You mentioned exercise. I was delighted to hear that. Because if you have exercised, you know you feel better. Right? And you are giving the scientific explanation for that.

We have talked about keto in a couple of other interviews on this summit. So those of you who are watching this, you have got in depth details of how that works, why it works. And now we have even finer details at the cellular level.

But what else should we do to heal that microbiome? I think you talk about in your book six keys to boosting your microbiome. Any tips you might suggest? You have probably touched on some of these already.

Dr. Perlmutter: I am going to put on the top of the list food.

Dr. Paul: Yes.

Dr. Perlmutter: Who knew? Well, there was a doctor friend of mine named Dr. Hippocrates. And he talked about that a long time ago. So food is number one. I mean here is a medical doctor. And I am sure it is not the first mention on your summit that food is critical.

Dr. Paul: Yea, let food be your medicine. Wasn't that what Hippocrates said?

Dr. Perlmutter: You bet. Most people now, I think, wonder if he actually said that.

I think it is very important and relevant to recognize that even at the moment of birth, decisions are being made that have an effect on the gut bacteria that are going to have lifelong consequences. So when a child is born and that child passes through the mother's birth canal, that child is invested with microbes. And I like to use the term "anointed." At that moment that child is receiving a huge amount of information in the form of those bacteria, their DNA, their metabolic products.

And these are the seeds for that child's upcoming microbiome. And when we deprive a child of that by having a cesarean section, for example—which happens in over 30% of the births now in America, which I think is preposterous, to be nice about it—we are setting up that child up for significant issues lifelong by dramatically increasing his or her risk for type 1 autoimmune diabetes, ADHD, autism, depression and obesity, to name a few.

And these are issues that that individual will carry lifelong. So we have to talk about how a child is born and choices that parents make which far transcend the notion of how big will my scar be, to embrace the idea that that choice to have a C-section or not has implications on your child for the rest of his or her life.

Dr. Paul: Yep.

Dr. Perlmutter: These are very important decisions early in life. I quoted a study earlier, indicating that exposure to medication is significantly associated with allergic issues and other immune related issues. And these can be really compromising for children because of the changes in immune balance that take place. Recognize now that our gut bacteria are playing a huge role in regulating our immune system. They are vitally involved.

Dr. Paul: Could I get your input on one thing before we leave the C-section talk. I am a pediatrician mostly and I also do addiction work. And in my prenatal visits, I am sitting with a new couple and they are pregnant and they are excited. And I say, there is this 30% chance you are going to have a C-

section. Do everything in your power to avoid it, for the very reasons you outlined. And I usually go through that.

And then I say, if you have a C-section, your baby goes into that hospital room typically, if it is a hospital birth. It gets exposed to the staph that is there, the C. diff that is around, just different organism that are not good. There is this idea of vaginal seeding. That is something I am sure you have heard of. Do you have an opinion about that?

Dr. Perlmutter: Well I do. As a matter of fact, I have a whole section in the book you held up, *Brain Maker*, that talks about the work of Dr. Maria Dominguez-Bello at NYU. And she popularized an idea of putting a sponge in the birth canal and then extracting those really amazing bacteria, keeping it moist and warm.

The mother has to have a C-section for whatever reason, and, in fact, there are very good reasons for a C-section that could be life-saving. And then there those bacteria are placed in the baby's mouth and nose and over its face. And after I wrote *Brain Maker*, she published several new studies on this technique. And actually, in the journal, *Nature*, more recently demonstrated recoverability of some of these organisms in the child's stool at age 6 months.

We know that it works to some degree. How effective it will be in terms of reducing the otherwise increased risk for certain disease processes, I think, has not been looked at yet.

This process of horizontal transfer of information: we receive information vertically, top down, in terms of our DNA that we got from mom and dad and from every human and ancestor that came before. So that is this transmission of information over time.

But we also receive an up-to-date report on our environment at the time we are born. That is when all the apps are loaded to the computer right at the time of birth. That vaginal microbiota is highly variable with respect to influences in terms of mother's nutrition, the availability of food, the environment, the stress, etc., changes that gut bacteria to prepare that newborn for the world that he or she will enter.

So it is this up to date download of information right to the second that that child will get to best prepare that child for the new world that he or she is going to enter. So when we understand that 99% of the DNA is not the DNA of our forebearers, but is the DNA contained in the organisms that live upon us and within us, we have to value even that metric, because it is huge.

When we deprive a newborn of that information, there are health consequences, which are well documented. I think the idea of transferring that material from the birth canal, prior to the mother getting the antibiotics, to the newborn, I think is really cool. How effective that is going to be remains to be seen. But just the fact that a forward thinking, outlier thinker like Dr. Maria Dominguez-Bello comes up with that idea, I think is very intriguing.

I will take an even further step. We know that mammals eat their placenta. One unpublished study, taking human placenta and putting it in capsule form—this sounds way out there—and giving it to mothers to consume—which sounds crazy—was associated with a zero percent incidence of post-partum depression. Now I am not going to stand behind it. That was not published in a peer-reviewed journal. I am just telling you that it is an anecdote.

Do with that information what you will. But the point is, this is what the paleo movement is all about. It is the idea of trying to emulate what our ancestors did. And our ancestors, first of all, I think most importantly is not that they ate or they did not eat the placenta. Let's leave that one behind. But what our ancestors did was they ate a lot of fiber. They nurtured their gut bacteria.

They ate fiber on the ground. They ate food that was rotting. Another word for that is fermenting. Fermenting of food is something we adopted 7000 years ago as a way of preserving food. But when food is fermenting, it is teaming with good bacteria and other organisms.

You know, we live in a very sterile world, a germophobic world, a world in which every endcap at the grocery store has hand sanitizers. We are encouraged not to touch the buttons in the elevator except using our elbows. When we get the key to our room at the hotel, there is hand sanitizer there, because we might pick up the germs of the clerk who handed us that key. That is, for our immune systems, our undoing.

Dr. Paul: Yea. We need to be around germs.

Dr. Perlmutter: Pardon me?

Dr. Paul: We need to be around germs.

Dr. Perlmutter: You bet.

There was a recent study by Dr. Molly Fox—I interviewed her on the Empowering Neurologist as well—looks at the prevalence of Alzheimer's disease in 100 countries around the world and plots that prevalence, how common Alzheimer's disease is, versus markers of their hygiene, meaning whether or not these people had high levels of parasitic infection and gut

diversity of organisms. And what she found was the higher level of parasites in the gut correlated with higher levels of diversity of organisms and lower levels of Alzheimer's in the population.

Dr. Paul: Yeah. You have that beautiful graph in your book.

Dr. Perlmutter: Yea, I do. I have that graph. Those higher numbers of Alzheimer's are westernized countries, the United States and across Western Europe and Iceland and things like that. So we have got to understand we have been colonized by bugs for a long, long time.

You mentioned something earlier. Let me just amplify if I could, the idea that we inherit the gene and then we are at great risk for things like Alzheimer's.

One recent study published last year looked at a population in Bolivia. And it found something about carrying the so-called Alzheimer's gene, the ApoE4 allele that you alluded to earlier, which we associated with a dramatic increased risk for Alzheimer's, those in that tribe living in the jungles of Bolivia. Those individuals carrying the terrible Alzheimer's gene were actually protected against dementia when they had high levels of parasites within them.

So what I am saying is the context in which we see these snips or genetic predispositions I think is very, very important as well.

Dr. Paul: Yep. Absolutely. This has just been so powerful. Thank you so much for that.

If you had to sum up lifestyle changes, what would you say? What if you have a family member, a loved one or somebody in our audience who is struggling with addiction? What if they are struggling with anxiety and depression or they are just struggling to get out of bed probably and to make it through the day? What would be the lifestyle changes that will fix your biome, that will heal your brain and get you on the path to wellness and health?

Dr. Perlmutter: Well that is a very good question. And I would say first of all, if you are going to implement what I am about to say, I would recommend that you do that in conjunction with working with a health care practitioner. You shouldn't take this as direct medical advice.

The first thing I would consider would be fasting. Certainly, if an individual is a type 1 diabetic, you are going to need to work very closely with somebody, if you choose to do fasting. I would say at least a 24-hour fast is a place to start, if a person can tolerate that. That is a good way, I think spiritually, emotionally and physiologically/metabolically to push the reset button.

Spiritually, it is a terrific way to reconnect. We know that fasting is a part of virtually all of the world's major religions, whether it is the fast of Ramadan, the fast that takes place on Yom Kippur, or Jesus fasting for 40 days prior to His public ministry. We know that it connects us.

It connects us to a sense of gratitude and empathy. And it immediately establishes a connection from a hardwire perspective to that part of the brain we talked about before. You light up the spiritual parts of your brain, which is exactly what we want to do, because it is those same areas of the brain that allow you then to focus on making good decisions moving forward. So that is why fasting, I think, is a very good thing to do to get a program started.

Thereafter, you need a diet that is extremely high in prebiotic fiber. That is not just going to the pharmacy and buying some fiber. It has to be prebiotic fiber. I am not saying probiotic. I am saying prebiotic. Those are the foods I mentioned at the beginning of our interview. But beyond that, go to the health food store and buy some prebiotic fiber made from acacia gum or from baobab fruit. These are some natural derived prebiotic fibers that will augment the health of your gut bacteria.

You really want to cut dramatically back on sugar and refined carbohydrates. Carbohydrates are not cut out from the diet completely because prebiotic fiber is a pure carbohydrate. Who knew? But the issue with prebiotic fiber is you don't metabolize that. Your gut bacteria do.

Welcome back to the table good fat. We are live in a very fat-phobic environment. But understanding things like olive oil and the fat that is found in grass fed beef or wild fish is very important.

You want to offload those fats that increase inflammation, because that will take you away from getting connected to that good part of your brain. These are the safflower oils, sunflower oil, soy oil, corn oil. Those are not part of our diet moving forward. And again, understand that things like artificial sweeteners, even though they are devoid of sugar per se, impart significant negative changes on the gut bacteria.

Moving forward, exercise needs to be part of your daily regimen. And for every individual, there needs to be a certain level that they tolerate. By all means, I am not suggesting everybody immediately run 10 miles a day or 5 miles a day or 1 block a day. I am suggesting that everyone could do a little bit more.

That could be a walk to the mailbox or anything that gets your heart rate going hopefully for 20 minutes a day. That is going to dramatically turn on

that gene that makes BDNF that will reconnect the brain. So exercise is important.

By and large the diet is high fiber, as mentioned, and pretty much vegetarian. Do you want to have 8 ounces of an animal-based protein? No problem. Good idea. But it should be grass-fed beef, as mentioned, wild fish, free-range chicken. Again, fat is not our enemy anymore. So free-range eggs are good choices. Use MCT oil to increase the production of ketones that I am sure others of your interviewees have talked about, very important as well.

I would say paying attention to your sleep choices, your sleep hygiene is critical. Restorative sleep goes a long way to helping rebalance neurotransmitters and is actually very good for the gut as well. There are many things I am sure other of your interviewees have talked about.

Having no more blue light after the sun goes down. Blue light we get from monitors, television, iPhones, other phones—I don't mean to pick on the iPhone—tablets, you name it. Blue light inhibits the body's production of melatonin and as such can have an effect on the immune system, which is a role of melatonin we don't talk about.

But obviously the important thing here is the depth and restorative nature of our sleep. I am strongly in favor, as long as we are talking about it, of recommending a sleep study. That means going to a sleep specialist, spending the night in a sleep lab, getting all wired up—I did it myself—and going to sleep. And let them evaluate the quality of your sleep.

Because so many people don't know it because they are so-called sleeping. But even though they are in sleep, it may not be fully restorative. Waking up in the morning still tired, moody, reaching for high carbohydrate, refined carbohydrate foods or other forms of addiction.

The main thing we are trying to do here is to empower people by regaining their connection to the part of the brain that allows them to stick to their important lifestyle decisions. And this is, I believe, the road to offloading addiction and clearly paving the way for health for the rest of an individual's lifetime.

Dr. Paul: Fantastic. Folks, there is a roadmap of what to do. We just need to take that last 3, 4 or 5 minutes and say, "Implement!" In parting words, thank you so much for the science behind the reasons we are recommending that people make these important lifestyle changes. It will absolutely skyrocket your journey to recovery.

If you are struggling with addictios, but you are not fixing these core things, the brain doesn't heal. Your gut/brain doesn't have a chance. Do you have any parting words? Maybe there is something I should have asked, but I didn't. I would love to hear it.

And then one final thought, if you have it. I think a lot of people who are watching are still maybe having trouble just making that final jump to do it, just to get going. I talk about in my steps the number one step is have a burning why, a burning reason that you want to make this change. These changes are simple, but they are not easy. Right? You have got to do it.

You are very focused in all your work. And I just want to give you one last shot at telling folks whatever is on your mind as parting wisdom.

Dr. Perlmutter: Well that is certainly wide open. I would say beyond understanding that all of us out here love each and every one of you and want to do everything we possibly can to give you the best information possible. I would say that what would be great is for each of you to get a mirror, look in the mirror and say the following, "I love you and I am going to do everything I can to help you."

That would be my parting words, because we all owe it to ourselves to do the very best we can. And everybody has struggles. Everybody has issues, whether we define them as addictions or not. There is not a person walking the planet who is fully offloaded from his or her early life experiences, because to some degree that makes us who we are on the one hand.

On the other hand, some of those things can be detrimental lifelong. We can offload our connection to those events as well by this process of making new pathways. So everybody can do it. And that, I think, the message is make it happen. You can do it.

Dr. Paul: Thank you. That was perfect. Viewers, we do love you. Everybody on this summit is trying to share a message of hope with you. Thank you, Dr. Perlmutter. This was just such a powerful, powerful message. And I can't thank you enough.

Dr. Perlmutter: Well, I sure appreciate the opportunity to be here today. And I mentioned it earlier that the word doctor does not mean healer. It means teacher. It means giving the tools for others then to implement. So that is what we do moving forward.

Dr. Paul: Amen. Thank you very much.

