How your gut bacteria affect your anxiety

Guest: Dr David Perlmutter

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[00:00:10] Alex Howard

Welcome everyone to this interview where I'm super excited to be talking with Dr David Perlmutter.

Dr Perlmutter is a board certified neurologist and five time *New York Times* bestselling author. He serves on the board of directors and is a fellow of the American College of Nutrition.

Dr Perlmutter received his MD degree from University of Miami School of Medicine. Perlmutter's books have been published in 36 languages and include the number one *New York Times* bestseller, *Grain Brain*, and the other *New York Times* bestsellers, *Brain Maker, The Grain Brain Whole Life Plan*, and *Brain Wash*, which was co-authored with his son, Austin Perlmutter.

In this interview, we're going to be exploring particularly the relationship of our microbiome, of our gut and how that is impacting upon our mind, our emotions, and specifically on the experience of anxiety.

So, Dr Perlmutter, thank you so much for joining me for this interview. Anxiety is obviously a big topic, and there's lots of ways that what's happening in our body is impacting the experience of what's happening in our nervous system and our mind and our emotions. But particularly one of those places is what's happening in our microbiome, what's happening in our digestive system.

Maybe you could say a bit just to open up the conversation, say a little bit around how does our microbiome affects the whole system, but particularly that experience of anxiety?

Dr David Perlmutter

Sure. The microbiome is really central to so many aspects of our physical health and certainly our mental health as well. And I think that whole notion has been very challenging for people to get their arms around. That microscopic organisms, call them germs if you will, if you want to derogate them, which I prefer not to, are really deeply involved in how we perceive the world around us, how we respond to stimuli, our moment to moment activity.

And just to set up a paradigm that we can then work from moving forward, recognize that we receive very powerful information about our environment via the foods that we eat. Traditionally, the foods that we eat would be an indicator to our physiology in terms of what's going on around us, very powerful information.

We'd like to talk about food in terms of the macronutrients, protein, fat, carbohydrates, the micronutrients, vitamins and minerals, but I think taking a step back, recognizing that food has traditionally informed the human body as to what's going on around us. Is there food scarcity? Is there

water scarcity? What time of year is it? Where do we live? What can food tell our microbiome to do to our bodies so that we might have a better shot at survival?

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And that's certainly a different view of the gut germs, isn't it? Germs in general are something that are to be avoided, to be cleansed of. And we recognize that the trillions of organisms living within the gut are really conducting the orchestra, aren't they? They are involved in regulating virtually every part of our physiology.

And the connection between our gut organisms and what's going on in the brain has been a real stretch for a lot of people for an awful long time. And continues to be that sense of distance, that these are not related. We tend to want to think about the body systems being compartmentalized. The brain is the computer, the heart is a pump, the lungs are bellows, but the reality is our bodies are far more integrated than we ever had conceptualized.

And that whole notion of an integrated human body has really been what healthcare practitioners have embraced for thousands of years in traditional medicine. It's only quite recently that we tend to segregate the various body parts and systems in a Descartes view of machinery, that this idea that the body has separate systems that do not integrate, do not care what the other parts are doing is really the foundation of Western medicine, where we have specialists dealing only with the heart, the brain, the skin, the joints, you name it.

But the reality is that so many of our fundamental mechanisms within the body are dependent upon what is the signaling coming from the environment, and that signaling is mediated by our gut bacteria.

Now, in the ideal situation, the gut bacteria do what they do best. They are manufacturing the chemistry of thinking, of cognition. The chemistry of mood via the various neurotransmitters that they are involved in manufacturing. And importantly, as it relates to mood, they are involved in regulating the permeability or leakiness of what is called the gut lining, the barrier that segregates the gut from the rest of the body.

Now, we depend quite aggressively on the integrity of that barrier, and it's certainly not a complete barrier, which is a good thing, because it does allow us to absorb our nutrients and it does allow us to absorb free water such that we get the things that we need to be healthy and to maintain all of our systems. But there are certain things that need to be excluded. So we have to maintain the front line gates, if you will, to determine who's going to get in and who's going to be excluded.

When we change the functionality or the array of our gut bacteria, and we'll talk about how we do that in just a moment, then certain things get in that shouldn't get in when the gut lining becomes a little bit more permeable and less selective about what it allows to get into the rest of the body.

Alex Howard

Just to interrupt you for a moment, I think with that felt experience, particularly for example, the symptom of brain fog, where somebody eats something and they have an intolerance or a reaction to it, and if anyone's ever had that experience of that foggy brain, that can come from that.

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I remember that when it used to happen when I had chronic fatigue back in my late teens, it took a while to figure out that I eat certain foods, and then I have this very neurological symptom, ultimately that happens in response to it.

But I think that just to really land this point that you're making, that what's happening in our brain, what's happening in our nervous system, what's happening in terms of the experience and anxiety can be directly driven by what's happening in our guts.

Dr David Perlmutter

That's exactly right. And I'm going to connect these dots for your viewers, but we've established now that one of the primary functions of the gut bacteria is to interpret the external environment, and that external environment becomes the internal environment via the food that we eat.

And certainly we know that other factors affect the gut bacteria as well. Other factors in the environment like sleep and stress and exercise and drugs and various other things that we are exposed to. But traditionally, historically, the big information input has been the foods that we eat.

And again, I'd like your viewers to consider food as information, as informing the internal milieu as to what's going on out there and preparing the human body to more, better adapt to a changing environment.

So as we return then to our discussion of this leakiness of the gut lining, that becomes very important because our response to being challenged by now some of these proteins and peptides and even bacteria and bacterial components is to actually amplify inflammation. And it is inflammation coupled with the change in the neurotransmitters that is so active as it relates to changing our mood, affecting how it is we see the world around us.

We look at the world in a different way when higher levels of inflammatory chemicals are circulating in the body, it paves the way for anxiety. And clearly, we know that depression is primarily an inflammatory disorder.

Alex Howard

When you say inflammation, can you also just define what you mean by inflammation? Because not everyone will be familiar with that term.

Dr David Perlmutter

I will. So inflammation is a physiological good mechanism in the body that helps us deal with challenges like infection, for example, or trauma. It's a way that amplifies our body's response to allow it to heal. But when it's chronically elevated or acutely elevated, it damages the function of our tissues.

As an example, in COVID infection, we know that there's something called the cytokine storm, which sounds very dramatic and matter of fact, it is. Cytokines are the chemical mediators that the immune system puts out as a response, an inflammatory response.

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So what happens in the so-called cytokine storm is there's a sudden overexpression of these damaging chemicals that damages tissues throughout the body, including the brain and the lungs and the heart and various other body systems.

But equally threatening is the sense of a small level of uptick of the cytokines, but over a longer period of time. So whereas the cytokines are not storming, there's not a huge storm, nonetheless, they're elevated and it becomes an issue for the human body because that elevation is over a long period of time, it is protracted above the baseline.

And this low level of increase of inflammation, as measured by these chemicals called cytokines, is at the root of our chronic degenerative disorders like coronary artery disease, type two diabetes, obesity, and even Alzheimer's. Alzheimer's is primarily an inflammatory disorder. We now recognize that mood disorders have, at their core, low level increase in inflammation.

So now we have connected mood disorders like anxiety to inflammation, inflammation to increase leakiness of the gut, increased leakiness of the gut connected to changes in the gut bacteria and changes in the gut bacteria indicated by changes in the diet, changes in all kinds of lifestyle issues that manifest as changes in the gut microbiome, leading to the increased permeability inflammation and setting the stage for us to be chronically depressed, chronically anxious, and really importantly, changing how we see the world around us.

And I'd like to explore that a little bit more deeply. Our decision making process, to simplify it, is really involved with two areas of the brain. One area called the amygdala, which is a primitive, more fight or flight, fear based area of the brain that when it is challenged to make our decisions, makes decisions that are very short sighted, very impulsive. Decisions that are self centered, narcissistic, don't consider both the future implications of what we might do, nor the implications in terms of how these decisions will affect us in the future or others around us in the future.

Versus making decisions from another area of the brain called the prefrontal cortex, which lives here behind the forehead. This is the far more sophisticated part of the brain's cortex. In fact, one third of the human brain cortex is prefrontal cortex, and that is an area that looks at as much data as it can, slows down, takes its time, and comes up with decision making that's based upon looking at a large data set, that looks at history, looks at memory, and projects to the future. This is the part of the brain that makes decisions that have implications for other people, for the planet, and for the future. It is quite literally the adult in the room.

Now, the good news is that this prefrontal cortex, this adult in the room, is connected to the amygdala, the child in the room that wants its candy right now, anything else be damned. And it exercises control over this child, the 5 year old, by what we call top down control. They are connected.

And we depend quite heavily on this connection between the prefrontal cortex, the adult in the room, to rein in, if you will, that child in the room. They are connected through pathways, one of which is called the anterior cingulate pathway.

And intriguingly, that pathway is virtually severed when inflammation is higher. Inflammation brought upon by leakiness of the gut, by not sleeping enough, by changes in the gut bacteria changing the way that you make decisions, the way that you see the world, the way that you act.

[00:14:31.] Alex Howard

Sorry to interrupt you but what's so interesting about what you're saying is, of course, each of those decisions and each of those actions have consequences. So what then starts to happen is we start to create our life in a way which actually perpetuates cycles of stress and anxiety.

Dr David Perlmutter

100% correct. So what you've just said, I want to unpack that a little bit more.

Once you get into this cycle where you're making more of your decisions from an impulsive perspective, from the amygdala because you've reduced that input from the prefrontal cortex, the adult in the room, you make worse decisions that tend to increase inflammation and therefore lock you into this amygdala based decision making.

And we've also now connected it via our discussion to our diets. And the standard American diet, which then became the Western diet, which is now pretty much the global diet, is a diet that increases inflammation by challenging and changing the gut bacteria.

In so doing, the change in global nutrition is changing our outlook mentally, globally, making us more self centered, impulsive, and less likely to consider what may happen to our planet tomorrow, to my neighbor tomorrow, to myself tomorrow, based upon this model.

And as you just characterized, the more we do it, the worse it gets and the less able we are to make better decisions to take us out of the rut, such that we become more anxious, we become more depressed. Mood disorders are increasing globally, and we know why. And we can say that, well, probably they're increasing because the world is becoming a more difficult place, e.g. COVID and other events occurring in the world right now that we are all aware of that are certainly threatening and worrying.

But the reality is that the mindset, if I can use that term, is changing based upon changing the functional wiring of the human brain globally, traced back to the change in human nutrition globally.

That has just connected quite a few dots. When we look at statistics globally that relate to increasing rates of mood disorders, particularly depression and anxiety, through the lens of the changes globally in the human diet, through the unpacking that we just did, this begins to make a lot of sense on the one hand.

And on the other hand, offers up some level of empowerment because we can change these inputs and regain control over what's going on upstairs. And that has huge implications for dealing with these ever increasing levels of mood disorder, the ever increasing rates of anxiety that are now very well documented globally, via making lifestyle changes that can reestablish this connection to the adult in the room and help us really start to center again and appreciate how we can be, how we could be, if only.

Alex Howard

Yes. And it also strikes me, beyond the wider life choices, one's more likely to make poor choices when they're in that amygdala reactive place, also, their food choices have been made from that place.

[00:18:04] Dr David Perlmutter

That's right.

Alex Howard

If we're in our adult chair, we're able to recognize that actually having a better chosen healthier meal that might take a bit more time to prepare and have a bit more involved in it, is going to be a better choice than just reaching for the immediate comfort, which is not just indirectly perpetuating the cycle, it's directly perpetuating the cycle.

Dr David Perlmutter

You're exactly right. And when we decide to park ourselves in front of the TV and go through a bag of chocolate chip cookies, we're so disconnected, we're just behaving to satisfy our desire right now.

And let's be clear, we all would probably like to do that, but what we choose to do, most people, or many people certainly who are watching your broadcast right now, choose not to do that because the adult comes into the room, into the brain, our prefrontal cortex is active and says, I know you'd like to sit in front of the TV all day, but right now we're not going to do that.

We're going to go outside for a walk, get some exercise, maybe do some strength training when we get home, and then do exactly Alex, what you just said, prepare a good meal, because we know that next year, 5 years, 10 years from now, we're going to have to answer for what we're doing today. Plan for the future, make better decisions.

And frankly, that is perhaps less easy. It is a lot easier to eat that chocolate cake. We all want it. Our brains are programmed to like sweet. Sweet is a survival mechanism that explains to our body that winter is coming, we have to make fat. And sweet food is generally, in nature, a safe food, not a toxic threat.

So we have deep programming, not as an app, but actually in the hardware, in the computer that you buy, our brains, that tells us to eat sweet. And that we can overcome by more adult based decision making from the prefrontal cortex.

Alex Howard

Well, I guess also the important point is if we go back to caveman days, sugar wasn't readily available in the environment in the way that it is now. So we might have had some berries.

Dr David Perlmutter

Not in the way that it is now, that's for sure. There was available fructose in the late summer and in the early fall when fruit became ripe and therefore became palatable. And that proved to be a very powerful signal to prepare our bodies for food scarcity for winter by increasing uric acid, which increases our production and storage of fat, increases our blood sugar, blood pressure, and increases inflammation and changes the gut bacteria, making us more impulsive in the day. That was a good thing.

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To be impulsive would be a survival mechanism because we would take more risks and we would then be more likely to encounter food. Yes, it was riskier, but that impulsivity and that going for it as it related to consuming sweets, were powerful survival mechanisms.

Now we are experiencing this evolutionary environmental mismatch whereby our evolution is telling us to eat sweet to survive and yet we're overdoing that 365 days a year because the incredible overabundance of fructose that we are exposed to day in and day out.

Alex Howard

So taking a bit of a dive deeper into the microbiome, please. We've just been talking about the impact of food. Maybe we can unpack that a little bit more in terms of how food directly impacts the microbiome, but also some of the, and you've referenced already, some of them, things like sleep, exercise, but maybe say a bit more about what ultimately is impacting what's happening in our microbiome.

Dr David Perlmutter

Well, food is certainly the biggest player by far and always has been. There is a powerful adaptable connection between, as I mentioned, the gut bacteria and what is going on around us, and the information highway is the food that we eat.

So food is moment to moment, informing our gut bacteria, changing what they do in terms of their metabolism, what they are creating, and also changing their array, their levels of diversity, which changes day to day, certainly month to month and season to season in a very powerfully adaptive way as a way of keeping us alive.

Our gut bacteria, by and large, need lots and lots of fiber. It's been estimated that our hunter gatherer forebears may have been consuming as much as 100g of fiber a day. Typically, modern man might consume 15g of fiber a day. And we need that fiber because that's the primary way that we nurture our gut bacteria. They break down fiber and use it for fuel to do the various things that they do, to replicate, to manufacture the various metabolites, the vitamins that we need, the neurotransmitters that have a role to play in how our brains work.

That changes as we get towards winter because there is some degree of anxiety that is created as a survival mechanism, ultimately through this mechanism of inflammation, to make us more impulsive, to put us in a place where we might take more chances, because that might lead to our survival.

We know that even primitive cultures that are around today have gut bacteria that look almost identical to the gut bacteria of our hunter gatherer or Stone Age ancestors. How do we know that?

We know that because we are able to genetically sequence and characterize the gut bacteria, the microbiomes of our Paleolithic ancestors. Because truth be known, there are samples of fossilized poop in the various caves. We can date that, we can determine how old it is and more importantly, we're able to derive from fossilized poop the genetic signatures of the microbiomes of our ancestors based on looking at fecaliths. Fecal fecal and lith meaning stone, so fossilized fecal material.

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Similarly, we're able to characterize the oral microbiome of our ancestors by looking at the calculus or the residual calcified material around their teeth that contains the signatures of the bacteria that lived in their mouths.

And again, what we find is that both the oral microbiomes and the gut microbiomes of our hunter gatherer forebears are really quite similar to those types of primitive cultures that are living today. We know that these individuals generally have lower blood pressures, have better bone density, have preserved visual acuity, have higher what is called Max VO2, so they're in better shape from a cardiovascular perspective. They have lower fasting insulin levels, so their blood sugars are better. They have lower fasting leptin levels that helps control their appetites.

All of the things I've mentioned are the hallmarks to the aging individual who lives in modern society based upon the changes that have happened in our environments, primarily with respect to the foods that we are eating, changing the gut bacteria and then increasing inflammation. Because it is indeed this inflammation that is setting the stage for the decline in visual acuity, in bone density, in Max VO2, all these markers that we tend to look at.

We know that a very powerful mediator of this activity is uric acid. So uric acid is, when elevated, is signaling our bodies. It's a primitive signal that dates back 15 million years to our primate ancestors, signaling our bodies that winter's coming. And signals our bodies to make fat, store fat, turn down energy utilization, increase blood sugar, increased blood pressure, all good things for our ancestors as survival mechanisms.

But these days, when we trigger this increase of uric acid, mostly because of our increased consumption of sugar, which fructose is specifically metabolized to uric acid, screaming in the body, getting ready for winter, we know that these are maladaptive now. So again, we're back to this evolutionary environmental mismatch where this pathway that kept us alive for all this time is now threatening our lives.

And for the first time in history, over the past four years, life expectancy, at least in America, where I live, has declined. And that began happening two years prior to COVID. COVID has had a huge impact on longevity, but let's be clear, it happened pre-COVID and really is based upon this massive shift upon our ancient physiology, challenging our ancient physiology.

Shift in the environment, changing the foods, the lifestyle that we have adapted, the very stressful nature of our lives, our lack of sleep, our lack of exercise, all contributing to dramatic changes in the mediator, the gut bacteria, which then downstream increases inflammation. And as such, as we've defined now, increases our risk for dramatic mood disorders like major depressive disorder and chronic anxiety.

Alex Howard

I want to back up to something specific you said, and I want to go a bit deeper into some of the ways that we can address issues in the microbiome.

You mentioned the importance of fiber, can you tell a little bit about sources of fiber? So if someone can recognize that if they've been particularly, of course, if someone's following a standard American diet, there are some very obvious changes to make, but there's a good chance people watching this conversation already have some basic fundamentals in place. But you are saying that we need

potentially 100g a day of fiber to really support the microbiome, often we're getting 15g, what can that change look like?

[00:29:01] Dr David Perlmutter

Well, I'm not going to suggest that people should immediately go out and start consuming 100g of fiber a day because I can assure everyone that you're not going to tolerate it. Is that a goal? Perhaps it is. But I would say we need to dramatically globally increase fiber consumption.

And rule number one is that there is no fiber in any animal product. So what does that mean? It means if you're going to increase... And I eat animal products, let's be clear. But it means if you want to increase your fiber consumption through the foods that you eat, you need to eat more plant based foods. So it means more plants on your plate.

And I would recommend that as you look at your plate, it should be at least 80% plant based foods, and recognize that that plate should be colorful. The variety of colors is a good thing. Color comes from the bioflavonoids and the bioflavonoids have really dramatic anti-inflammatory activity, and that is key, getting back to our discussion of the relationship between inflammation and mood disorders.

So you can use supplemental fiber. And I actually supplement my diet with fiber that's derived from two sources, Acacia gum. The Acacia tree in Africa is that big shady tree where the giraffes hide out in the middle of the day. Acacia gum is a resin that is secreted by that tree and is harvested in such a way that it doesn't hurt the tree, so it's sustainable.

And the other is baobab fruit, also an African fruit. Baobab fruit renders an incredible prebiotic fiber that really goes a long way. You wouldn't want to take 100g of straightforward prebiotic fiber you don't need to. When I say that our ancestors consumed 100g of fiber, that's all the fiber that they consumed.

Some fiber that is contained in fruits and vegetables is specific because it nurtures the gut bacteria and we call that prebiotic. Anything that's prebiotic, that nurtures the gut bacteria. Prebiotics are things that lead to changes in the gut bacteria that offer a health benefit to the host, meaning in our case, us.

We are now seeing science looking at what are called postbiotics. And these are actually manufactured products from the gut bacteria or their cellular components that again, lead to a health benefit for the host, meaning you and me.

So we're now seeing research and actually seeing products being marketed that not only have the prebiotic in it to nurture the bacteria, the probiotic, meaning the bacteria itself and the postbiotic, meaning added to the product, these things that the bacteria make and components of the bacteria that all render some health benefit.

That's the key. That's the definition of prebiotic, probiotic and postbiotic, that they ultimately all have to render some health benefits. So we're now looking at a term called WholeBiotics, meaning this whole component amalgam of pre, pro and post to give maximum benefit to ultimately target what the gut is doing. And certainly one important thing is to bring more integrity back to the gut lining.

[00:32:45] Alex Howard

Can you say a little bit as well about really what we're trying to achieve? Because what we're trying to find is a balance in the gut. We're not talking about trying to get to a point of sterile environment of no bacteria. What we're trying to do is to find a balance which is optimal and healthy.

Dr David Perlmutter

That's right. I used the term earlier, 'germs' because nobody wants germs. We want to wash our hands and use mouthwash and sterilize everything so we don't have germs. But the reality is that without germs, without those microbes living in the gut, we would die quickly. And we know that even if you sterilize the gut, you never really fully can, but it'll repopulate itself quite readily and quite quickly.

And when we talk about the gut bacteria, a couple of things are really important. There are many types of organisms in the gut that are well beyond bacteria. We know that viruses in the gut are good things and outnumber our bacteria ten to one. The bacterial cells outnumber our body cells, maybe by a factor of ten to one, although recently that's been debated. And the viruses in the gut are called bacteriophages because they are involved in regulating the levels of the various bacteria that live in the gut and their activity as well.

So in a very real sense, ultimately we've got to start paying attention to these viral particles, these bacteriophages. There's a lot of research now going on that looks at, for example, how cognitive function in humans and certainly in animals, is affected by the levels of certain classes of viruses living in the gut. Just when we thought we were starting to get a pretty good handle on understanding the bacteria, what needs to be there or not, now we have a new issue, a new variable which has got viruses.

It's good though. The research continues to move along. We actually are seeing products on the market now that in addition to prebiotics, probiotics and postbiotics, actually contain bacteriophages, viruses in the probiotic to enhance the functionality. That is, I think, pretty breathtaking. We now recognize that organisms live throughout the body. They live in the brain, they live in all of our tissues.

And exciting new research challenges the notion that cancerous tumors are sterile. We now see that, as a matter of fact, there is great research showing that many cancerous tumors have in their cells, bacteria. And that these bacteria are involved in determining how readily a cancer may spread and beyond that, how susceptible a particular cancerous tumor may be to chemotherapy, being regulated by the bacteria living within the cancer cells.

So we've been exploring this microbiome. I wrote a book called *Brain Maker* about that many years ago and pushed the boundaries then, but look where we are now. I mean, the notion that the bacteria in the gut are controlled to some degree by the viruses in the gut that ultimately has a role to play in gut permeability and therefore inflammation, and therefore our mood is to some degree being regulated, not just by the bacteria but by the viruses living in the gut.

Why it's exciting for us in medicine is because it may turn out that we see that changing this milieu, the microbiome. And the microbiome encompasses viruses, bacteria, their DNA, their RNA, and their metabolic products. Those changes that we can institute in the microbiome might be a tool to help people with mood disorders. Changing the microbiome can help with depression. We already know that. There is some suggestion that it can help with anxiety. But man oh man, for me as a neurologist to be turning to the gut in that regard is really quite fascinating.

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We published a book two years ago called *The Microbiome and the Brain*. I was the editor of that book. I wrote the foreword but not any chapters. We recruited the top twelve researchers and clinicians from around the world to contribute chapters. And I would admit that one of the chapters dealt with what are called bacteriophages and how they change in relation to a disease called Parkinson's.

So we're in a really exciting place now where we're on the ground floor. We have got a long way to go. It's a nascent time in our understanding of what's going on in the gut and how it relates to not just the field of gastrointestinal issues, but how it relates to psychiatry, for example. That's a pretty exciting new tool in the toolbox.

Alex Howard

And I think that's an important point to make because I think there could be people watching this conversation saying, well, I don't have digestive symptoms. I can eat anything. My digestion is fine. And I think the point you're making that's really important here is that there are people that may not have obvious digestive symptoms, but the origin of the issues they're dealing with can still very much be in their guts. And I think that's an important distinction to make.

Dr David Perlmutter

Absolutely. And there is a type of change seen in the microbiome that may then manifest as gastrointestinal issues, but many other changes do not.
One thing, gets back to your comment earlier about eating a certain food and noticing brain fog. I think people would recognize that that's a specific, likely a specific response mediated by changes in neurotransmitters and probably inflammation.

But you're right, inflammation is the silent killer, especially as it relates to the brain. When your toe is inflamed by having gout or stubbing your toe, you feel it. It's painful, that's for sure. It swells, it turns red, you lose function, and it's painful. The hallmarks of inflammation.

The brain does not have any pain receptors at all. You can slice into the human brain while somebody is awake, while you've opened the skull. And in fact, this was done for epilepsy surgery and still is today. That you are working on the brain of somebody who's awake and they don't feel it because the brain does not have pain receptors. Why would it even need them?

And so the point is, there's no way of knowing when your brain is inflamed. That inflammation is not registered like it might be, again, if your elbows are inflamed, you'll know that for sure. But you don't know that your heart is inflamed with coronary artery disease and yet it's going on. You don't know that there's higher levels of inflammatory chemicals circulating in your body as a consequence of having type two diabetes.

One of the most powerful tools that we have as an indicator of inflammation in humans is called a tape measure. Put that around your waist. If that's a big number, quite likely there is a significant upregulation of inflammatory chemicals being produced in your body. It's not sophisticated, is it?

Sure. We know that there's a correlation between your average blood sugar, your fasting blood sugar, C-reactive protein, all these markers but you just have to stand on a scale or just ask yourself, do my pants still fit? If the answer is no because they're too tight, you've turned on inflammation. You've

threatened your mood, you've increased your risk for Alzheimer's and coronary artery disease and cancer and diabetes, and as via our earlier conversation, you are separating your thought process away from good decision making and that leads to further bad decision making related to your lifestyle choices.

[00:41:16] Alex Howard

And to bring it back to some really simple fundamentals that folks watching us can put into action. So someone that's resonating with what you're saying and even recognizing they're often making those poor decisions, what are some of the key fundamentals that people can start to put into practice to improve what's happening with their microbiome? Obviously, there's more sophisticated testing they can do and supplement based protocols, but what are some of the fundamental starting points you would say?

Dr David Perlmutter

There are sophisticated tests that can be done. How valuable they are, I think, is still being determined. I think it's important that people generally recognize that most everyone needs a gut rehab.

I think step one is to look at what you're eating. And I think we all know what makes for better eating and what is threatening our health, but understand that it's not just your health that's being threatened, it's your health being threatened by the fact that you are threatening the viability and the activity and the diversity of your gut bacteria. You've got to take care of those little guys because they hold the sword of Damocles. They determine whether you live or die, basically, and how you see the world around you.

So I think stepping back and eating a diet that is less refined, that doesn't come with a barcode on it, is really a powerful and simple important first step. Then if you can force yourself to begin exercising, it's really important. Why? Because ultimately that's going to help reduce inflammation, and that will help you with your decision making. Then you'll even make better decisions as it relates to the food choices.

Get to bed earlier, try to have more restorative and better sleep, both in terms of its duration and its quality, and ultimately learn that there are various things in your life that are stressful that are threatening your health, directly threatening your health, and as such, affecting your risk for disease and certainly putting you at great risk for mood issues like anxiety and depression.

Depression is rampant as we're seeing with anxiety. Increasing rates globally. And today, you and I have had the opportunity to talk about how it relates to lifestyle choices through the lens of what is going on in the gut, meaning what we eat. There are a lot of inputs into making those better choices.

First, get the knowledge in terms of what's best to eat. Be more plant based. I again, am not fully plant based, but more plant based ever than I ever have been, with good reason, and recognize that this is all about making better decisions. And it takes some time to re-establish our connection to the adults in the room and really bring on board guidance, better guidance for better lifestyle choices, which play out to an increased health span and certainly lifespan and a happier life.

[00:44:31] Alex Howard

What I'm really hearing you say, Dr Perlmutter, is really moving it from a vicious circle where you eat the wrong things, which then affects your microbiome, which then affects your choices, which means that you create more stress, that you eat more of the wrong things. So in a sense, trying to flip that to a virtuous circle where you start to eat better, which means your microbiome functions better, which means you make better choices.

Really, I think what you're saying is you can change that cycle at any stage in the cycle, but if you can make that change in the food choices, then it can then have a significant knock on impact.

Dr David Perlmutter

That's right. What we're trying to break are these, what are called feet forward cycles, where it just gets worse with time. And you can understand how it gets worse. You make bad food choices, you increase inflammation, you sever your relationship with the adult in the room, and you make further bad food choices. You stay up too late at night, you don't exercise, you do all the wrong things.

And what we offered back when we wrote this book called *Brain Wash*, were what we call onramps to better decision making. And people use the word hacks, but simple ways that we can re-establish some connection and get rid of what we called in that book, 'disconnection syndrome'. That's what's so prevalent these days.

And it's forcing yourself to get out for 20 minutes in some sort of natural environment. That's a huge first step to decrease cortisol and help reduce inflammation. Ask yourself, what is the level of exercise that I can do? It might be I'm going to go out for a 5 mile run or maybe I'm going to walk to the mailbox and back because I haven't done that for a while. But, you know, every journey begins with the first step, and we've just got to get started.

And that's the hard push. That's the hard tipping point. It's just getting started. But I think my mission, and I think when I hear you speak as well, is just to give people the tools, the empowerment, to really be the directors of their health destiny. And it's a gift. That's what this is all about. It's empowering through giving these tools, giving this knowledge.

And truthfully, it isn't that difficult. And it's not intensive in terms of buying this thing or that thing. You don't have to have a gym membership, you don't have to have a continuous glucose monitor or a vast array of blood tests and stool analysis and genetic testing. No. Those things can help, don't get me wrong. I discuss those things at length because I think they're very powerful tools, but they're not mandatory, especially for getting started.

You do have to probably buy a new pair of sneakers or running shoes. Maybe that's it. But it's just saying today's the day, and I'm going to be taking control here of my health destiny moving forward. And within a couple of weeks people become so grateful. And that's important that we re-establish our connection to the sense of gratitude. That is also something that is severed when we disconnect from the prefrontal cortex.

Gratitude for all that there is, all that is going on around us. That glass can be looked upon as being very much half full or even overflowing but there's such a tendency to look at the glass as half empty. And I'm not saying bury our heads in the sand. We know that there are issues that demand our attention that are happening in our world today, but that requires a dedicated amount of attention

each day and then stop. Then realize that for your own health, both physical and mental health, you've got to dedicate your lifestyle choices.

[00:48:29] Alex Howard

It's a commitment ultimately. And I'm sure at this point there will be people wondering how they can go further with your work. Maybe you can just signpost a little bit, your website and also you mentioned some of your books, particularly your most recent book, *Drop Acid,* which I thought was fantastic. But say a bit about how people can find out more about you and your work.

Dr David Perlmutter

I think that if you really want to get to a good understanding of our decision making, the impact of inflammation and how to re-establish connection to the prefrontal cortex, the book is *Brain Wash* and that is a *New York Times* bestseller.

If you want to understand more about the microbiome, the book, also a *New York Times* bestseller is called *Brain Maker*. And my new book which talks about uric acid elevation, which is so prevalent worldwide, which amplifies inflammation, leads to weight gain, high blood pressure and elevation of our blood sugar, as you mentioned that book is called *Drop Acid*. That's also a *New York Times* bestseller and is available globally.

So those are, I think, written to be helpful. I think that they are helpful books for a lot of people. My books are in 32 languages around the world, which I'm very happy about because I believe these are important messages. The word 'doctor' doesn't mean healer. It means teacher. So that's what I focus on, is learning about things and then making that information available through venues like our time together today. So I'm very much appreciative of that.

People can visit my website, it's drperlmutter.com and that gets to everything else that I do, the videos, *The Empowering Neurologist* podcast, that's a good place for people to start.

Alex Howard

Fantastic. Dr Perlmutter, I really appreciate your time as always, and I love your ability to make all these connections between these pieces and actually make it practical. So thank you so much.

Dr David Perlmutter

Alex, thank you so much again for having me.