Food Talks: Choosing Health Or Disease For Us Transcript

(Transcripts are generated by AI and may contain errors)

Introduction and Collaboration

Welcome, Jeff. And thank you so much for agreeing to be part of the MS Neuroimmune Summit. Now to everyone, this is Doctor Jeff Bland, who we all know and love as one of the founding fathers of the science of functional medicine.

He is a bio scientist. He is brilliant. He's taught me a lot. I'm so grateful for his mentorship and his friendship. Jeff, have I left anything out? No, I, I think the fact that we've been walking down this, path together here, this journey for probably more time than we really want to admit, but it's been an extraordinarily enriching.

Both friendship and professional, collegial shepherd that I've had the privilege of sharing with you. And I think that we can see that and the influence of what happens when people work together from similar principles and start to enrich one another's ideas.

It has much greater impact. So I think that this is a model for many people, as it relates to cooperation and collaboration and communication. The three CS working together?

Absolutely. You know, you and I both have an intense love of polyphenols and what they do for health. So let's sort of dive in. What is a polyphenol and how does that interact with their health.

Yeah. Thank you. So I got very interested, as a consequence of of your work and the whole nature of this whole food is medicine movement that we're witnessing rise up around us, over the last few years as to what was the nature, if we would think of a mechanism that was observed in the blue zones.

And Dan Buettner, his work and the blue zones are these areas around the world where people live, extraordinarily long and healthy and they don't have access sometimes to modern medicine, and yet they seem to live into their centurion years, still going outside and having community and doing stuff in the world and not being chronically ill.

And so I really started to think about this much more deeply from a, a Buddhist medicine perspective. What do we know about what they eat? What do we know about how they live?

What Polyphenols Are

The so-called principles that Dan Buettner talked about that are common among these groups. And interestingly enough, by the way, as you know, one of those blue zones happens to be not Sardinian, not, Costa Rica, but Loma Linda, California, right in the middle of LA county.

And they breathe the air. They drink the LA water. So what the heck is going on with these people that suddenly they're found to have these characteristics of longevity and lower the incidence of chronic illness.

And when you look at the commonality of whether it's basal, get seventh day Adventist community or the medical school, their alumni, and then the university medical school is the seventh day Adventist medical school.

And they have certain principles about eating, which are plant forward kind of eating. And, a lot of things that are kind of comparable in nutritional, composition to what you find in these other blue zone areas around the world.

And so when I started to look at, analyzing the diets of these places, one of the characteristics I don't want to say it's the only one, but I think it may be an under, appreciated one.

Is it all of these blue zone diets, including people in in London, London, are very high in this family of nutrients that you just mentioned called polyphenols.

Now, what are polyphenols? Well, we would simply, I think, know them as, agents that add color to vegetable and fruit products. So this is the old eating of the rainbow concept that when you eat foods that are natural, grown in the soil, they come out as beautiful and fruit products, and they have colors ranging from purple to red across the full visible spectrum.

Those coloring agents are members of these, some of them are members of these, these polyphenol or flavonoid families. Some of them are carotenoids, which are interrelated, but the majority of them have these polyphenol or or flavonoid characteristics.

Now, it turns out, if you're a food chemist, and study polyphenols, you suddenly learned that there are literally thousands. Then probably more than 10,000 different, polyphenol compounds in different foods.

So the first thing you know, as a person eating food is that the color of the food and the flavor of the food tend to be interrelated. Second, as a food chemist, we learned that those characteristics are to some great extent as a consequence of these polyphenols and flavonoids in the food.

And then third, as a cellular biologist, we learned that those polyphenols play extraordinarily important roles in how the cells work, because they are epigenetic modulators of gene expression.

Now, what I just said, right. That last part of my soliloquy is a revolution, a new concept. I mean, I'm talking about it's still dripping wet with new discoveries.

We have thought in nutrition that these polyphenols and flavanols in foods were kind of, secondary things that were not really that primarily important for human nutrition.

And in fact, if you go back and you look at Textbook of Nutrition for which dietitians were trained or nutrition scientists were trained, you'll find the topic of flavonoids or polyphenols may occupy only a few pages in the whole of a several hundred page textbook.

And the reason that it was found to be unimportant was or relatively unimportant was no one could find a deficiency disease that was associated with the absence of evidence.

So it was not like vitamin C was scurvy or vitamin B one would very, very or vitamin B3, niacin with pellagra we we couldn't find a deficiency disease.

So people thought, well they're interesting. They're there, but they don't play a really important role. Then people started to say, but hold on, don't you think they could be antioxidants?

They could actually soak up oxidant damaging things that in your cells. And so the work in flavonoids and polyphenols for a period of 20 or so years went heavily into looking them as antioxidants.

And all the literature that we might read were focused on their antioxidant potential. But then scientists started to say, but hold it. You can't really describe the effect that they have on cells solely on the basis of them being antioxidants.

And the reason for that is that antioxidants would be like anti acidity factories. We know that they're influencing things other than just preventing a cell from going rancid from from injuring a cell.

There are other things that are going on. What else could be going on with paranoids beyond their serving as antioxidants? And that's where the story just the last few years has gotten so remarkable, robust and exciting because now it's been found that these paranoids, different members of the family, have differing effects around how our genes are imprinted upon genetically to regulate how the genes in our cells express their function into becoming the cells that do the work in our bodies.

Epigenetics and Gene Regulation

Okay, we stop you for a moment, Jeff. So epigenetics people in the audience may not know what that term means. Yeah. Thank you. So you might think of our genetics, as being like an analogy that people have used is like a computer system.

And so you have the hardware, the computer, and then you have the software, the computer, the hardware, the computer is our genes and our genetic code that's locked that God set.

When the sperm at the egg, we didn't get a choice. Whatever we got was the luck of the draw. And those genes are the 23 pairs of them make up our chromosomes.

That's our book of life. And that is the hardware of our genetic information. However, and this is the point that I think people are starting to now recognize that 23 pairs of chromosomes, it's our book of Life, has many stories in it.

The stories are our genes. Thousands of different genes, actually tens of thousands. And the genes are not all expressed in every cell all the time. Because if we were to read our book of life all the time, continuously in every cell, we'd be a mess.

Because, you know, our cells are them are the Book of Life stories for every cell that's different in our body, for the liver cell, the heart cell, the brain cell, the skin cell.

They all have stories in our book of life. But if they were all being read and expressed simultaneously, think of what our body would be like. We'd be a total mess.

And remember where we came from. A lot of people forget this, that we came from a single cell that was fertilized, a single ovum from our biological mother that was fertilized with a sperm, and those combined together to form a fertilized ovum that started to divide, develop fetal development, that became every cell type in our body from that single cell.

Now, how did that occur? Because if it was a single cell, how did it become all these other cell types, of which there are hundreds of different cell types?

It did so by the fact that as these cells were dividing, and when we were in fetal development, that some of the messages of our book of life was not expressed in the next cell that was replicated, that was genetically modified.

There were marks that were put on the the book of Life that allowed only the liver cell to be said, or only the heart cell to be said, or only the brain cell to be said.

And so we started to differentiate into this us what we are today. So when we finally were born as an infant, we were the complex, outcome from this developmental biology process of epigenetics.

Now here is where the story gets interesting. It was thought until recently that that process only occurred in fetal development, or maybe in very early infancy, but it stopped.

You weren't going to be changing the way you were epigenetic marking your genes after that because people said, well, how about that was to occur in your genes?

Were were being changed in the way they were expressed over the course of living? Wouldn't you start to become a mess over time? So you must control the way your genes are regulated very carefully.

So the liver stays, the liver, the heart stays the heart, and so forth and so on. Well, that is true. 90, 98% of our genes are not being changed when we're later in in age.

But now it's suddenly been found that there are these components of our genes that can be still modified by epigenetic marks in later life, even into age life into a geriatric years.

These are the genes that still are able to pick up messages from our environment, from our lifestyle, and alter their epigenetic epi means above the genetic code.

So this is the software. This is the software that lays on top of the hardware. The hardware is our genetic code. The software is our epigenome that tells the hardware how to work just like our computer.

So the food we're eating is talking to these epigenetic markers and silencing some genes, turning other genes on. So I'm assuming that some of the food will turn on disease promoting genes, and some food could turn on health promoting genes that actually make it.

That's exactly it. That's the to me, that's the major discovery that's of our age. When I say our age, I mean the last 10 or 15 years. So when we talk about ultra processed foods, I mean, you've done a such a brilliant job of educating people about, what happens when you eat these highly processed food diets very rich in sugar and processed fat?

Those and there's a couple examples of those kinds of foods. Jeff. Well, I would say these are here snack and convenience foods, generally the things that are made to be shelf stable for years.

And you can put them in your camping kit and have them for years and pull them out later and eat them. And they are foods that are, ultra processed to have sweet fat and salt as the principle of taste perceptions and the psychobiology of the human taste mechanism tends to love these because we are already seeking for energy, and these are foods that can carry a lot of easy, quick energy and sugar.

Okay, sugar goes right into our blood and goes right into our cells. And and so it's like an energy food, but it can also glut the cells. And so these highly processed sugar, fat and salt rich foods that generally come in grease, soap bags or sealed packages are the things that then contribute information to our genes, epigenetics that cause our body to think it's under stress.

And when that's the case, what happens? It goes into an alarm mode, which we call inflammation. So now the dominant themes we have in our culture, eating these ultra processed foods are inflammatory diseases of the nervous system, of the immune system.

And so you want to talk a little bit about the health promoting foods. And so if the yeah, the ultra processed foods, snacks, etc. are talking to our genes in a bad way.

What? We'll talk to my genes in a good way. Okay. So let's go back to our blue zones again.

Ultra-Processed Foods and Inflammation

So the people that have been eating these traditional diets and these blue zones have been sending messages to their genes, epigenetics. And why do I know it's epigenetic like me?

Someone might say, well, hold on, Jeff, if you're born in Sardinia, you just have the genes of a Sardinian that may be resistant to these diseases. But what happens if a genetic Sardinian moves to the Western world and starts eating these ultra processed foods?

Their genes didn't change, but their disease profiles become like everybody else. They get the heart disease, they get the dementia, they get the diabetes, they get the all the the kind of autoimmune diseases that we see in the Western world.

So the hardware didn't change. What changed with the software, which is the epigenome. So the people in Sardinia eating the traditional Sardinian diet are the individuals that are sending messages, epigenetic play, to their genes to create what I call bliss outcomes, to create helpful outcomes, to see life as a journey of extraordinary joy.

And that's what we associate with health and resilience. Now, what I've just said previously is the major new

discovery is that these nutrients and foods, the so-called polyphenols and laminitis, which we used to think of in nutrition circles as kind of secondary placeholders, they weren't really of that much importance in terms of cell biology or health.

Now we're saying, whoa, just a minute. These five protein polyphenols that are found in these diets, of people that live in the blue zones, are actually modulating the epigenome to turn on the health genes, to turn on the resilient genes and to turn off the genes of alarm, the genes of of inflammation.

That is a huge, huge advance in our understanding of how food this medicine plays out in our cultures and why we should do the things you've been talking about in the way that we design our diets to avert, then the catastrophe that occurs when you get inflammation present in your nervous system.

Can you give our audience some examples of foods rich in polyphenols? Well, you could think of the whole Berry family as being very, very rich in polyphenols.

You could think of actually dark green leafy vegetables as being very rich in polyphenols, in the flavonoids. So things like, kale, spinach, Swiss chard, beet grease.

Exactly. Really? You could think of, certain non gluten, whole grains, seed grains as being very high in fiber noise and, you know, things like buckwheat.

Yeah. Buckwheat. Quinoa is very high in that, millet, a very high millet. You know, you actually it's interesting. Buckwheat and millet are the oldest known cultivated foods in human nutrition.

They go back 4000 years of known cultivation, and they're very, very high in these epigenetic modulating polyphenols. And they are foods high in people living in the blue zones.

So, you know, the story kind of fits together as we start to look at it. How about things like walnuts, nuts? Well, maybe right off the head of the list.

Walnuts are, I think, the highest, the highest food or one of the highest foods. Maybe we would say pomegranate as well, but one of the highest foods in ellagic acid.

So ellagic acid is a very, very important member of the polyphenol family. And ellagic acid gets converted by friendly bacteria in our gut microbiome in a series of secondary, by, chemical secondary substances that have really powerful effects on immunity and on longevity.

So we start to say it's not only the consumption of these polyphenol rich diets, but it's also a friendly microbiome. It plays an important role because a microbiome eat these polyphenols and produces its own secondary products, which are beneficial to our body's function.

So it's a complex system. It's an interaction between these big molecules and the polyphenols that can't get into our bloodstream. But the microbes eaten digest them.

Blue Zones and Health-Promoting Diets

And then, those byproducts get into our bloodstream or, they're just still talking to our immune cells to combination. It's a really good point that you made, you know, we used to think that things had to be absorbed into the blood to work, but now we recognize that our immune cells, pick up this information locally because they're right next to the gut microbiome.

60% or more of our immune system is clustered around our intestinal tract and so-called, gastrointestinal associated lymphoid tissue. And so those cells can pick up the information directly.

But then there is also trans, cellular absorption of these, these metabolites into our blood that then distributed

throughout the whole of the body, so it can influence immune cells that are on our brain, like the microglia immune cells that exist on our liver, the Kupfer cells, immune cells that exist in our muscles and all kinds.

So all of these can be nourished by the proper metabolites and occur from eating a polyphenols and flavonoids and having a healthy microbiome. This is wonderful.

We've been talking about polyphenols and flavonoids. Could you clarify, is it the same thing or are they slightly different molecules? Jeff. Yeah. Thank you. That's a great question.

So flavonoid is kind of the general descriptor of many subcategories of molecules that are found in plants. And so there are there are subcategories like flavonoids.

Flavanols are flavonoids. Still monoids there are many subcategories. Those are kind of grouped together around a chemical structure that are termed polyphenols.

Polyphenol is kind of a chemical nomenclature for this structural similarity among these different families of molecules. So the flavonoid family are the thousands of different food ingredients that fall into this chemical nomenclature that we call polyphenol.

So if we really wanted to be specific, we would talk more about the individual flavonoid families that are all members of this broad class called polyphenols.

If I remember, these are ring compounds that are connected together. I was going to say we we have just recently had the benefit of a discovery that I think is frameshift.

And it's so relates to your remarkable work that you have contributed to the evolution of our field. This is a collaborative, study, a study that I thought would probably never, ever be done because I thought technically it was impossible, but it has been done.

It's a collaboration between investigators at Harvard University School of Public Health, Harvard Med School, Mass General Hospital, Rush Medical Center in Chicago, and it's looking at the impact of the so-called mind diet on cognitive and neurological function.

Let's up let's let's explain what what does mind stand for. Yeah. Thank you. So mind is an acronym that refers to a diet. It's a combination of the Mediterranean and Dash diet principles.

So it's a plant heavy plant forward diet that's been, we all know about the Mediterranean diet. The Dash diet is a guide to stop hypertension. So it's low in sodium, high and potassium, low in saturated fats, more in poly unsaturated oils.

And it's the combination of the Dash diet along with the Mediterranean diet produces what they call the mind diet. Yeah. Mindy, it's an acronym for that.

And it's been, studied extensively over the last ten years with a lot of clinical human work, actually, that has evaluated its effect. But this most recent study to me is it's mind blowing.

So what this recent study has done, just just published in preprint this last month, in December of 2023, is they looked at this in 24 people who were deceased, which they had been following for 20 years on the mind diet or on the ad lib diet.

And they then once they had passed away, these are individuals that had signed a agreement to have biopsy done of their brain. So brain tissue was taken postmortem and it was analyzed.

I know this is going to be a little geeky here, so hang with me here. It was analyzed by transcriptomics, meaning it was asking how the genes are being expressed in these brain cells of people that were on the mind diet or on the

Ad-lib diet.

Polyphenol-Rich Foods and the Microbiome

And when they did this transcript, transcriptomic analysis, which is pretty detailed evaluation of how the genes are being expressed in these cells of their brain, they found out that there was a very significant difference that would separate the people on the ad lib diet from the main diet.

They were their way that their genes in their brain were being expressed, which is different. We should remind people that ad lib means you get to eat what you want, right?

Yes, exactly. So the traditional American diet that some people call that sad standard American diet. And so what they found is that you could separate these two based upon the way their genes are being expressed.

Now, the question was, well, what genes were being expressed differently in the brains of the people that ate the mind diet versus the people that ate the standard American diet?

And they found the genes that were being expressed were genes that were related to cellular repair, to immune vigilance, to and DNA repair, to repairing genetic information in the mind diet.

You had people who had their body, their brain cells were being rejuvenated basically by the consumption of the diet. Now here is really the takeaway clinically, they also did cognitive function tests on these individuals before they passed away, obviously.

And they were able to show that there was a correlation between the alteration in the way their genes are being expressed and their higher cognitive function, greater short term memory, greater neurological function, more resilience.

I think this is an unbelievably important study for us to understand that somehow we are at the genetically modulating how our brain is actually expressing its function by the foods that we're eating, and it can be demonstrated in the laboratory by analyzing gene expression patterns in people that have passed away, who had higher neurological function.

By the way, the mean average age of these people was around 90 years of age. So they've been following them from from 70 to 90. You know, I've looked at several of those studies, and I was looking at, the, parameters that they use to track diet consumption because they're using food frequency questionnaires. Right.

And so they were measuring, were they having green leafy vegetables? I think it was three times a week. Were you having, a Serena Berries? Every day? And that's us.

As I was looking at all of this, I was like, you know, this sounds remarkably similar, to another dietary pattern, of which I'm familiar with. And that's the the walls, dietary patterns, figures that I was I was not surprised that they had had done so well because they also stress, you know, getting rid of the added sugars, getting rid of the ultra processed foods, flour based cereals, breads, pastas, white flowers. So why don't we talk a little bit about the difference between the Mediterranean diet, the mind diet and the paleo diet?

And so what's different and what's somewhere between those three diets? Yes, as we know and again, you are one of our champions for this whole area. So I, I'm deferring a lot of this to your knowledge.

But there is this debate that's going on now between, I guess, the strict vegan and the omnivore. Can you eat animal products and still be healthy, or do you have to be just a strict vegan?

And I think that your work and, and, you know, Mark Hyman wrote a book called The Keegan Diet, which is kind of a combination of vegetable based and paleo.

Mind Diet and Brain Gene Expression

I think the the work is showing and your work is as the Sentinel, I think, in this area, is that the appropriate use of animal products? Hopefully. Has been incorrectly or organically raised and I go way back in my history.

I was very fortunate, some 30 years ago, to be on the board of the first organic meat company, Coleman Natural Meats, out of, Colorado, swatch, Colorado, and a as a consequence, I had the chance to hang out with their cattle in their ranch in Colorado and see the difference between the animals that were raised antibiotic free, that were raised on natural pasture, that didn't go into feedlots and get fed corn, and didn't get a lot of that.

Well, they got no veterinary medicines that would be culled from the herd if that. And so they were certified to fulfill these criteria. And there was no question in my mind that, the quality of the product that was produced by them, both in taste and in composition was entirely different than the commercially dead meat.

Now, we had a very, very big challenge in getting the USDA to agree that there could be an organic certification for animal products, because the Cattlemen's Association resisted this vehemently, they didn't want some classification of meat that would look like it was different than traditional kind of, raised meat.

And eventually and when I say eventually, I mean over 20 years, it was a a long term effort. We eventually developed enough momentum, energy and science to support that.

This designation could be applied and used for animal products, and now it's used with chicken as well that was raised under these kinds of conditions.

So I am a strong believer that it's not just meat, it's it's how it is raised, where the animal comes from, how it's processed, and the appropriate combination of that within the diet.

Making sure that plants become a major part, a minimally processed full range of the rainbow and whole whole of seed grain, gluten free is is really the the diet that you've been advocating as the the diet that emerges from the science to be the best approach for sending the right epigenetic signals to our gene?

You know it again, for everyone who's listening to this, think of our evolutionary history. You know, we, diverge from, the primates. And, you know, about 7 million years ago, we've been eating plants for a long time.

We gradually started eating more and more meat and we migrated all across the globe with reproductive success, eating a wide variety of foods. So there are many diets that are healthful.

But the one diet that is not is a diet that's rich in added sugars, rich in flour based products that are used to create cereals, breads, pastas that are delicious but devoid of nutrition and don't have those signals that Jeff's been talking about.

Those polyphenols that speak to our genes, that tell us to maintain and repair ourselves so we can stay healthy and vigorous this whole time. What you just said is a transforming principle.

I think, doctor, was for the health of the planet. I was going to say health of the of the United States, but I think it goes across every human being.

You know, I, I'm reminded I was introduced when I was a starting young professor back in 1970. I was introduced by, actually a dentist in our community who came to one of my lectures and he said, Jeff, are you familiar with Weston Price and nutrition and physical degeneration in his book?

I said, no, I, I've never heard of Weston Price. Well, it turns out Weston Price was, was a dentist at the turn of the century and in the last century in, in Baltimore, Maryland.

And, he and his wife, he was a very successful and and so they were able to travel widely. So they did a lot of

travels, but not your normal kind of tourist travels.

They went to, areas of the world to visit that were still traditional living. And you might even say they were like the first of the blue Zone visitors.

And so they would go around the world and they'd visit these individuals that were consuming diets and living lifestyles that were consistent with, you know, hundreds of years of history.

And they did very detailed because he was a dentist, they did very detailed measurements of their oral health and measurements of their mandible and their maxillary regions and their oral cavity and their teeth and their gums and, and, you know, they found no periodontal disease.

These are not people that blister floss then didn't go to have their teeth cleaned and and they found healthy bone structure. And they didn't have asthma and they didn't have respiratory problems.

And so he wrote it this up. This was a course of a number of visits, that he and his wife took in these, these travels into this book and nutrition and physical degeneration.

Mediterranean, Paleo, and Animal Foods

And he lived at a very important time because what was just being introduced in the 30s was the first a food processing that really started to become ultimately going to the shelf stable foods that made our grocery stores of today to before.

We didn't have the kind of grocery supermarkets that we we have today. So he was living at a time where those were just being introduced. So as he came back later in his business, these same communities that he visited pre industrialization of the food now it was post industrialization and he could watch the degeneration of the people.

And these are the descendants, the second generation. So he he made photographs and measurements again of their oral health and so forth, demonstrating clearly that as the diet changed in these processed diets, their health changed, their physical structure changed and their longevity changed.

And so this is kind of a classic work. I know the first part and your foundation has kept this alive, these, these documents over the years, but that that book and nutrition and physical degeneration is, I think, a classic that really captured this time in history when this transition was being made.

For the audience again, when was this published? Was this like in the 19, 40s at this? Yeah, 30s and 40s, I believe. Exactly. Again, this is a wonderful, wonderful book.

Yes. Amazing photographs. It'll certainly change your thinking about disease and health. It'll change your thinking about your dentist chair. And the most important thing we can have for better dental care has to do with eating tough, chewy food, eating lots of plants, eating berries, and, getting rid of the sugar.

Processed foods. Yeah. You're here. And and you know that we're tied together later with, Bob and shares work. That's why it's called The Price Pot and your foundation.

So Robert Pottinger was a physician and and, Los Angeles area, and he had a tuberculosis clinic. He was because that was a disorder in the 30s, it was still very prevalent.

We we didn't have a really good therapies for it. And so sanatoriums were the place where people often went, get over tuberculosis. And so he started doing studies looking at nutritional relationships to recovery from tuberculosis, which was, as we know, is a is an infectious disease.

And as a consequence of that, he started this to say I well, I need to do a study with an animal model.

Weston Price and Nutritional Degeneration

So he chose cats. So this is the the classic plot, mature cat studies in which he started feeding cats highly processed food rather than raw food. And he studied what happened to the cats over generations of feeding this highly processed food.

And he was able to produce the first, as I recall, Cat with autoimmunity, that there was a third generation cat. And so then he found that if he wanted to replicate the cats, by the way, this is all epigenetics because he's not changing the genes.

It took three generations to replicate the cats back into health after he had had undergone degeneration over three generations of feeding, depleted foods.

And much later, then Doctor Lucille Hurley, who was, highly regarded nutrition research investigator, University of California, Davis, she's she's now deceased.

But, she had been doing work on nutrition and immune function. And she confirmed in very controlled studies that if you retard specific nutrients over the course of three generations of a specific animal species, that it will develop these chronic immune dysfunctions, and it takes 3 to 5 generations to repeat them by giving them back the nutrients. So this is the example, I guess the good story epigenetic is two way street.

Epigenetic Recovery and Closing Remarks

We can either take us down the road towards, you know, health, or we can turn around and go the other direction on the street towards regaining epigenetic health by giving the right information in our diet and lifestyle, a very powerful part of history that we're learning again today.

As the epigenetics becomes more well understood. Well, that is a great place to end our conversation, Jeff. So everyone who's listening, there is so much that we can do, even if you have poor health now by depleting your nutrition with these great compounds, these polyphenols, we can reset your epigenetics and begin sending the better software towards your immune cells and towards your, repairing capabilities.

Perfect for the great summary. Thank you. Jeff, this is Glenn. Wonderful. Thank you so very much for being part of the M. S. and Neuro Immune Summit and my great privilege.

Thank you so much.