The Unexplored Link Between Autoimmunity And Melatonin Transcript

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Introduction and background

Welcome, Deanna. I am so thrilled that you agreed to be interviewed. I always love chatting with you. You have such a wonderful message and such wonderful energy.

Oh, it's great to be here with you. And what I'd like you to do is introduce yourself and explain why you have such expertize in this area. Okay. So we are going to be talking about melatonin and autoimmunity, specifically M. S, multiple sclerosis.

So I am a nutrition scientist. I have a master's of science and a degree in medical science and nutrition related fields. So I have natural curiosity towards all things plants, plants, phytochemicals, which is why I am very interested in the Rainbow Diet.

In fact, I gave a talk at one of your conferences is on Eating the Rainbow and Dietary Diversity. So thanks to Dr. Jeffrey Bland and other of my teachers who have led the way in that particular area, I have continued to carry that banner forward.

You know, I love your message, have a very shared passion for the benefits of plant diversity and just how critical it is to have a more diverse palate.

You know, my my kind of our friends really hate plants. They think plants are poisons, but they love talking about all the hermetic stress with Sana's, with ice baths, with high intensity interval training.

But they seem to forget that plants can be part of that lovely traumatic stress as well. And fortunately, I, like you, also believe in that globally for better stress from plants and a diverse diet.

Yeah, in fact, Terry, there was just some research that is emerging now in what is called plant neurobiology that plants can learn, remember and communicate out there smarter than we have previously thought.

And in fact, I mean, think about it. I mean, they've been on the planet longer than human beings. So they have a lot of intelligence that we take in when we eat those plants.

That is fascinating. And you're reading about the the fungi that connect plants and these theories that plants are communicating and sharing information and sharing resources through their fungal networks.

In though it would be fun to talk about that. We're going to talk about melatonin. So let's talk just real briefly for everyone. What is melatonin and why and why should we care?

Yes, well, most people think of melatonin as a hormone. It's an indoor amine. It is produced primarily by the pineal gland to signal circadian rhythm for the body in order to lead us into sleep.

However, what we see throughout the lineage of research on melatonin is that melatonin is in animals, it's in plants, and it's in the human body. We can make it, although our propensity towards making it starts to decrease throughout the lifespan.

So most people, when they think of melatonin, they think, oh, there's some connection there with sleep. There is. But I would say that that's not the primary connection for melatonin.

Melatonin goes way back from an evolutionary standpoint.

What melatonin is and why it matters

In fact, melatonin is the growth factor in many plants that gets that plant to produce phytochemicals. So we site we see it in plants, right? For that reason.

In animals, it's very similar to us. What you're going to love is that melatonin is I would say, out of all of this cellular organelle. It's highly concentrated in the mitochondria.

The mitochondria preferentially takes up melatonin and can even synthesize melatonin. Now, we might ask the question, well, why is that? And I have some ideas about that. Why?

So, yeah, there has to be sort of thinking about insulin. You know, I learned about insulin through the pancreas and was shocking was I read that bacteria and viruses parasites also use utilize insulin as a nutrient sensing hormone that is much more ancient than pancreas.

And so now I'm begin to think melatonin is probably a similarly ancient molecule that is much more ancient, I bet, than even the pineal gland. And it was probably around when the nervous system didn't really exist.

You're absolutely right. You're absolutely tracking on where it's been. It was in plants. And if we look at the eukaryotes in which we had, we started to see organs defined.

Eukaryotes for people. So we we see these cellular organisms that have gone on to to to be larger organisms. Right. So there are very simple celled organisms with organelle.

Okay. That's how I think of it. Maybe you have a different definition, but that's about where it so. So as species were were evolving, we started to see the the increase of melatonin.

It's actually referred to as an ancient molecule. So it is thought that it has in some way moved through plants and then through humans and animals as a way of helping the species to survive in the environment.

And that's not coming through the circadian rhythm per say, at least I don't think it is. What melatonin is primarily known for is its antioxidant potential.

It's a very strong. And here's what's unique about melatonin and its antioxidant capacity that most people don't know. It likes fat and it likes water, which means that it can traverse anywhere in the body.

It doesn't have limits. Vitamin C has limits. Vitamin C likes water. It stays in the blood compartment for the most part in certain organs. Right. Vitamin E is fat soluble.

Melatonin is is very it can wear multiple hats. It has many natures. This is called amp of silk. So one molecule of melatonin can quench up to ten free radicals, which is very potent because usually most antioxidants can just scavenge a few, a handful.

But melatonin is pretty potent in that way. Okay. Now, I've heard other scientists tell me that that's why I need to get my person out into the daylight, particularly in the morning, soon after sunrise.

So we look at the sky, get the ultraviolet light to the back of my retina and reset my circadian rhythm so I'll make more melatonin in my brain and my mitochondria.

Do you agree with that suggestion? Well, it's part of the story. There's more to it. Okay. Let's do part of the story. Here's the part of the story that's missing.

Melatonin is the molecule of darkness, which means that your pineal gland does not produce melatonin unless it's absolutely dark. Meaning that into the nighttime hours, if we continue to stay on our smartphones, our computers, our Kindles, we're watching television, we have that artificial blue light.

We do not like that. So it's not the we we have what's called darkness deficiency, I believe, and we talk about this in

our recent Nutrients paper published in 2022 and this is a concept that one of the naturopathy doctors on our team had been thinking about because she's an expert in sleep.

Do we have darkness deficiency? So it's it's yes, it's important to get that early morning light, but it's even more important from the pineal gland perspective to actually get darkness.

You know, this is so true. When I paid much more attention, got my all of my screens shifted in terms of the app so we could shift the frequency of the light.

And I started wearing red glasses at night. I put red lights in my home. So when the sun went down, we flipped all the lights off, turned on the red lights only.

I convinced my spouse to have a red light in the bathroom. Otherwise, we're in the darkness. My sleep definitely improved. There you go. So. Wow. So that those are everything that you just mentioned would be the strategies to reverse darkness deficiency.

So number one, blue light blocking glasses, do they work? Is there science? Short answer. Yes. Definitely best to be wearing them and of course, there are all different degrees of the different kinds that are out there.

But it's just best to cover the retina because the retina, the eye, the back of the eye is where the light comes in. So the more that we can stop that from coming in, the better.

And that will preserve the integrity of the pineal gland to then produce the melatonin. Now, the other thing is on our screens, we can lessen the brightness, which I think overall is a really good thing.

You know, if we just didn't think I know that MMS involves the eyes, ocular issues are on the rise overall. And I just have to wonder whether or not there isn't a connection with all of this light exposure or how much we are getting.

Light, darkness, and circadian rhythm

This is not normal. This is not what we've been doing for the past 100 years. So it's not to say that we have to refrain from them. We just have to get smarter about our smartphones.

Right. So the flux fell dot U. Now there's an app that I think most people should know about because the measure of light is called Lux L, u x and there's a great app.

It's free and I have it on my phone. It's light meter and it will measure the Lux and it has yet to light meter. There are different ones, but I found a free one.

And what you want is, you know, if you if you have it in your environment and I have it in my bathroom, it's telling me. So it's going by the the light in the back here.

So it has, you know, 22 Lux, 16 Lux. What you want in order to have good, healthy sleep is ideally under one lux. You want one lux or you need darkness like.

So in other words, if you're in your sleeping room, in your bedroom, ideally you don't want to be able to see your hand at arm's distance away. Now, one, it's so dark in that room.

I'm going to tell you, Dana, when people have masks and balance problems. Yeah. You're in fall risk. Yeah, that's true. We probably need to let them have some light.

So what I tell folks is red lights. I like that. I like that. And also a sleeping mask so they can take it off. Yes. When they need to be mobile and get up out of bed.

So. So we don't want people falling, but I think a red light will help you a whole lot. A sleeping mask will also help a

whole lot. I personally I personally like putting a towel over my face a hand to.

Oh, because it because I have to I have tried general neuralgia. Yeah. Pressure on my face. I cannot tolerate it for very long. And so I have not tolerate sleeping masks.

It seems to create a problem for me. So. But I can tolerate a towel across my across my eyes. And that works very well. That's a great idea. Yeah. Anything to minimize the amount of darkness, right?

I mean, I do think it do do the best you can with what you have and need to make that work. Now, one of the other things about melatonin is it's a temperature sensor.

So, you know, that feeling when it start, at least for me at around 9 p.m., I start to get a little cold, a little chilly. That is what I would refer to as this peak of melatonin.

It's kind of letting you know it's time to go to bed. So melatonin is a temperature regulator, right? It's a chrono biotic. It establishes circadian rhythm together with clock genes and the rest of the body.

It's a potent antioxidant and anti-inflammatory. So mitochondrial regulator and it's also changing temperature as it relates to sleep. So when we get that first dip of like where we feel a little bit chilly, where we want to just take a nice comforter and wrap around it and watch TV, that's probably the sign that it's time to make your way to bed.

Now, another thing that I like to do is take a cold bath or an ice bath before going to bed. Before going into bed. Oh, wow. And what I've discovered is if I take the time to do that and, you know, life can be busy, I don't always do that.

I fall asleep the quickest. I have the deepest sleep and I have the best sleep score on my sleep tracking apps. All right. Well. Then my wife's. Strategy.

Honey, I don't like those cold legs. Could you do your showers in the morning? Oh, poor Jackie. So? So, like, okay, you know, happy wife, happy life. So I did adjust my my cold stressors.

Now, how how would I know if I have enough melatonin? Well, first and foremost, I think we look at the age of the person. So one of the things that we see through the trajectory of this as a hormone is that in the first three months of life, we don't produce a lot.

Most of that can come from the mother's milk, or eventually we start to see that increasing children have the highest levels of endogenous melatonin. They're sky high.

The highest you're ever going to be is when you were a child, which is why I think it's kind of an anomaly that we have so many kids on these melatonin gummies and chewables.

I, I think that we need to be really cautious about how melatonin is used in children. So then further from that, if we look at the life span, what we see is that there's that subtle decline into middle age.

And by the time somebody hits about 50 to 55, which I'm in that range, the melatonin that your body is making starts to bottom out. By the time you're in your sixties and seventies, it's flatlined.

So our body does its best to be producing melatonin. But isn't it interesting how the rise of a lot of neurodegenerative diseases and other chronic diseases start to sync up with that same pattern?

Now, I'm not saying that everything is related to melatonin, and melatonin is part of the web of other hormones. So cortisol has a relationship with melatonin.

So when you wake up early in the morning, cortisol is at its peak. It responds to that day, daylight, that daytime, whereas melatonin is the hormone of darkness.

Right. So those two have that that overall relationship, just like vitamin D, it's the vitamin of the sun. But melatonin, is that what I would call the nutrient of the darkness?

So as we get older, how do we know for low in melatonin? Well, I think that the most reliable approach, quite honestly, is to look symptomatically, to look at things like immune issues, to look at age as a part of that, to look at mitochondrial dysfunction in the individual.

Because if the mitochondria is dysfunctional, chances are there can be an issue with melatonin. And so immune is where we see, I would say, the preponderance of data on melatonin.

It stacks up, which is why if you think back to the, you know, the literature on COVID, even long COVID, many articles were coming out on vitamin D, vitamin C, zinc and melatonin.

So that also piqued my interest. Right. So there's this long standing history of looking at melatonin for its various properties as it relates to the immune system.

Wow. Okay. Then you mentioned that melatonin and plants, like all of them.

Melatonin, sleep, and temperature regulation

Usually the seeds of a plant. So where there's a lot of growth in a plant, you would tend to find more and fruits as well. So some of the top sources would be things like cherries, nuts and seeds of various types.

And in the paper that we published, we have a whole table on all of the different foods. And, you know, it's everywhere. It's ubiquitous. The problem is, is that the amounts are picograms and nanograms, which means very small, very, very small amounts.

Like you'd have to have thousands of cherries in order to get a 0.3 milligram endogenous level of repression of melatonin. So it would take a lot of the food source is not to say that we should neglect that, but it's just it's harder to get to the levels that we need with aging and with certain dysfunctions like the immune system and mitochondria.

So, yes. So in plants but not enough that it's going to really contribute to my melatonin needs. What do you think. I I'm I would never discourage you from eating plants.

You and I are very aligned. So I do think that we can get some modest amounts of melatonin from plants. The other way that we can get melatonin in the diet is from tryptophan.

And if everybody remembers their biochemistry, tryptophan fan, which is an essential amino acid typically found in animal foods but also found in plant foods, tryptophan converts to serotonin converts to melatonin.

However, by the time if you look at all of the conversion steps to go from tryptophan to melatonin, there are many in there end somatic steps and some of those enzymes need cofactors.

One of them is a methyltransferase so we all know about methylation and how much we need in the way of nutrients cofactors for that conversion. So that's why perhaps we can surmise that if people have turkey like on Thanksgiving, it's a holiday, they might get a little sleepy.

It could also just be because they overate, you know, lots of different aspects there. But yes, we can find melatonin throughout the diet. It's just that the amounts that are in the diet, depending on our needs state and trying to fulfill and replenish to get back the gap with aging, we probably cannot get enough.

So does that mean as we age and I'm older than you, so I'm in my sixties, I should be taking melatonin. People with M. S. in their fifties should be taking melatonin in addition to eating all these plants that you and I both are very fond.

Well, what are you suggesting for folks? Well, everybody needs to work with their health care practitioner. I can't make any specific recommendations per se, but I can speak to the literature of what is available.

So if we speak about multiple sclerosis specifically and say, well, what is the strength of the data on Ms.. What we see is that there is some strong data on mice starting to emerge, some clinical work.

So looking at how melatonin may be linked to things like severity and relapse with Ms., we can enhance quality of life with melatonin, especially in patients with Ms., especially with sleep disturbances, things of that nature.

There are some other studies that are coming out now, albeit some of these studies are smaller. You know, there are probably a couple of dozen people in this study, so they're not huge studies with thousands of people like we've seen for other indications.

But in general, because of the role of melatonin in the immune system, we would surmise that there would be some benefit in especially with immune and mitochondrial crosstalk.

Now, there was one study I can recall in Ms. Patients where they did find a decrease in IL one beta, and that was after taking, I believe it was three milligrams of melatonin.

Yeah. Preview that study. You know that study. Okay. So very good. So now the other thing that's important with Ms. is that melatonin can help with the promotion of antioxidant enzymes like catalase superoxide dismutase, glutathione, peroxidase and even glutathione iron.

So a lot of those antioxidant defense systems are important in mice. Okay. I think just just a moment for for the listeners, these enzymes are located in the cells.

And what are they doing in the cells? How are they good for us? Yes. Those particular enzymes are helping the cell to better defend itself against free radicals.

They prevent the body from going rancid, so to speak. So they sequester a lot of these free radicals of different types. And each of those enzymes likes different types of free radicals.

It's part of the support system. Who's listening? You know, the mitochondria are the factory doing the work of generating our compound's ATP that the cells use to drive the chemistry of life.

And every factory has some trash, including our our factories. The mitochondria in the trash that the mitochondria are having is the those free radicals.

And that's what is talking about is that because the cell knows it's going to manufacture this trash, they also have on hand the fire extinguishers in.

Those are those enzymes that are those antioxidant enzymes spot on. I love that description that that's excellent for people to understand because if you think of the mitochondria as the powerhouse, that's all well and good, but it's also producing, like you said, a lot of garbage.

Yeah. And it's we would call this in free radical biology, oxidative bursts in order to get energy. You have to give energy. So there's a lot of exchange in that mitochondria and that exchange can be damaging for the cell and even the mitochondria if it doesn't have protection like melatonin.

Okay. Yeah, in every we have our cell. So other body we're continually doing chemical reactions to stay alive. You want to give our listeners a sense of how many chemical reactions are happening in myself?

I'd say on a per second basis. Oh goodness, I don't have that exact number. Would be like thousands would be thousands. You know, I heard it was a million per second.

Melatonin levels, aging, and immune health

Now, I don't know how accurate that number is, but clearly it's a life requires a lot of chemistry that vacillates back and forth, back and forth in a very cyclic ebb and flow fashion, whether it is thousands or tens of thousands or hundreds of thousands or millions every second.

What I hope everyone hearing is that there's a lot of chemical reactions that are happening and there'll be a little stuff, a fair amount of stuff that generates some trash along the way that has to get mopped up.

And that's where these enzymes are. Our cells have to protect us from the trash that occurs in the midst of all this chemical reactions. And so, again, what is the role of melatonin in helping us manage that trash production?

It's primary and it works together with all of the different vehicles I just mentioned. So one of the tidbits here here's a practical actionable for everybody listening.

There is some recent science that came out that suggests that at 2 a.m., at about 2 a.m., we have the highest levels of melatonin, the highest levels of catalase, superoxide dismutase glutathione on including down peroxidase, these different enzymes and compound the glutathione that I was referring to, which tells us that sleeping the time that we are sleeping is a time for repair.

So if we neglect that time of sleep in a darkness, when our body can get in and start to get those toxins removed, those metabolic byproducts of the brain and the neurological system, we're going to function better the next day.

And in fact, the lymphatic fluid, which is very specific to nighttime and it's one of the ways to remove toxic amyloid byproducts from the brain, among other things.

Well, there's been some initial research to suggest that melatonin may play a role in the transport of these toxic metabolites into the lymphatic fluid.

Now, that is not in humans, that would be a very difficult study to do in humans. But the idea is, is that sleeping time is rejuvenation time for the mitochondria and the whole body really.

And all your body's systems are trying to coalesce and collaborate and work together and streamline in that process while you're sleeping. So all of those defense systems are in tandem.

Okay, so again, actionable items get outside, get your morning light, get your artificial light reduced in the evening, reduce further at night, use blue blockers and red glasses, a red light, a nighttime mask or nighttime towel and then think about melatonin.

Do we have plant sources of melatonin? We do. And that that's what I can I believe it was like 1958. They extracted from the pineal gland of a cow, the melatonin and some of the early melatonin supplements were derived from animal sources.

Then there were issues with viruses, prions and a number of different issues. So then it moved to synthetic melatonin, which was cheaper to, you know, just to spew out some chemical reactions.

However, as of late, there are plant melatonin. It's not too many. And in fact, the one that I like the most is Urban Tonin, because it's from Rice, Corella and Alfalfa, and it's a combination and it's from the cell matrix.

So it's not an extract, it's just from the plant. It's from the plant itself. So I like plant melatonin sources. There's one study published in Molecules 2021 in which they compared synthetic melatonin to plant melatonin and specifically disturbed tone in finding that it outperformed an anti-inflammatory activity in free radical scavenging and overall antioxidant potential.

So there is more in the plant melatonin than there is in the synthetic melatonin. And in effect, because you and I

both care so much about detoxification, one of the things from a paper in 2018 that I found is that there can be up to 13 different toxic adulterants potentially in synthetic melatonin, and that's just due to the processing.

You know, if you don't have like a good quality of melatonin and you don't know what else could be in there, there could be things that are not so good for the body and could be counter to what you'd want.

Now I'm thinking as I'm getting older, I more melatonin would be useful. Do you have any sense of the kinds of doses of has anyone looked at dosing melatonin at the age of 61?

Presumably, I'm not making my own endogenous supply nearly as well. So here's how I think about it. I think about how do we replenish back to what we had, similar to what we might do with estrogen and progesterone or testosterone.

It's kind of like, okay, what did you have back when you were 30? And if you look at those amounts, they're about 0.3 milligrams, a very low dose. You know, so many people are taking very high doses of melatonin.

Yeah. Which haven't all been studied and well researched. So I go back to one research study, I think it was in the early 2000s and it was by Dr. Wortman's group at MIT in which they looked at 0.3, one milligram and three milligrams.

I think that that was like the dosing regimen and they found that 0.3 was just enough in order to get the response with sleep and a lot of the other effects.

But as you go to high, it may lead to other effects, like some people have what's called the paradoxical effect of melatonin, where it actually causes them to stay awake.

And that might be due. Now melatonin is processed through certain liver cytochrome p450 enzyme systems, right? So if you are a fast metabolize or slow metabolize or you can change your metabolism of melatonin.

Food sources, dosing, and plant melatonin

So if you take too much and you have certain gene variants, this is why many times I like for people to do this under the guidance of a health care practitioner who understands the science, the nuance and a way to find melatonin at a dose that works for the individual.

Yeah. You know, I think in my clinical practice, I like to have people start low and go slow as a response. And some people will do very well on a very small and some require a larger dose.

So that's that's exactly what we were talking about in this research review article. Go low. Go slow with dose. Yes. For the shortest duration, it's kind of like even bioidentical hormones and what is talked about within the field of hormones overall. Right.

Go low, go slow, shortest duration for the effect. Now, one of the things that we don't talk about is the gut. And if we think of the root causes of M. S, we talked about oxidative stress.

We talked very minimally about inflammation. But I know that your listeners are very well in tune with inflammation. Many people are talking about it.

The third thing that may be implicated in M. S is dysbiosis and an imbalance in gut health. What's interesting is that the gut produces 400 times more melatonin than the pineal gland.

Now, the pineal gland is very specific. You know, it's at night during darkness. It goes through the systemic circulation. It's connecting through clock in a very hormone like way, an endocrine way.

So endocrine meaning you have a gland that produces a substance that travels systemically to have an effect. But

in the gut it's different. It's more auto.

Corinne Para chrin meaning that the, the gut produced melatonin is used in a more local effect. So it's typically we see an influx of melatonin produced by the gut locally after a meal.

So it's not stimulated by the light, it's stimulated through the postprandial response, probably of many different neuroendocrine signals. And I was able to found to find some research looking at polyphenols, which I'm really keen on.

I know Dr. Hyman's into polyphenols. Everybody's talking polyphenols now, but there was some initial literature looking at the role of maybe an interaction between melatonin, polyphenols, establishing a better gut microbiome.

I think that that's all in its infancy. But I do know that the gut produces the lion's share of melatonin in our bodies. If we look at cellular organelle, it's definitely the mitochondria, but organ systems, it's not the pineal gland, it's actually the gut.

So that begs the question, in mice, where we see that melatonin could play into multiple of the root causes, could there be a benefit here? And I think that it's it's worth a try.

It's great that you try this with your patients at a very low dose just to see if there's a response. Right. You start low and see what happens. Yeah, absolutely.

Absolutely. Take your time now, do you think there's a role for this? So we've been talking a lot about EMFs, but there are many other new immune conditions.

And I'm thinking things like rheumatoid arthritis, systemic lupus, inflammatory bowel disease, psoriasis that also have neurological symptoms, headache, pain may have psychiatric symptoms, anxiety, depression.

Is melatonin probably an issue for those other no immune conditions as well? Could very well be could very well be. And again, looking at immune health overall and its mechanisms, I think if we can think in mechanisms, we can think in applications, right.

In everything that you just mentioned involves inflammation. So could melatonin be important for those conditions because of its potent anti-inflammatory effects?

The answer would be yes. Now, when I was working with the team to put together this review article, the other autoimmune condition that seemed to rise to the surface as far as emerging research was Hashimoto was.

So there was some preliminary work on Hashimoto's. You know, again, I think that the clinical trial work and actually seeing the studies where you have the populations, you give a certain dose, we still need to see a bit more there.

But I think in general, based on mechanism alone, we could postulate that melatonin could work very well for these conditions. It so I mentioned the systemic autoimmune problems.

What about some of the peripheral, you know, chronic inflammatory demyelinating that's more of a peripheral neuropathy monitor itis a multiplex, you know, again, a peripheral nerve that we think has an autoimmune disorder.

Are you thinking that melatonin may also be a factor for these more localized peripheral autoimmune problems? I think it's too soon to say that for sure.

However, again, if that is an inflammatory generated process, then we might be thinking about melatonin for that. And I don't think it's just melatonin.

Melatonin can work well like we learned about during the pandemic with vitamin D and actually vitamin D and

melatonin seem like brother and sister. One is yin, one is yang. They seem to work.

They they're both in the skin. They both respond to light. You know, I call them circadian nutrients because they seem to have functions that go beyond their classical, just like melatonin is more than a hormone.

Vitamin D is more than a vitamin. In fact, vitamin D is actually talked about as a hormone. So I think in a lot of these conditions, any autoimmune condition, we have to first start with the foundational basics, which is what you and I love.

The colorful fruits and vegetables that's the bulk of the food is information type signal and reestablishing through those phytochemicals, cellular responses to stress to hormones, adaptogenic effects.

It's even been thought that melatonin could act as an adaptogen in its way of helping the cell to better function. In response to stress. The fine adaptogen for the listener.

Sure. So adaptogen is typically well, I think of it as a plant, and Herb can also be a food. There can be a wide ranging definition there, but it can help the cell to better deal with stress through its defense system.

So let's say a cell has the potential to be a little bit more upregulated in its response to stress a plant or an adaptogen can help that response. And that can sometimes happen at the level of the gene.

Melatonin in autoimmune conditions and closing remarks

It can sometimes happen at the level of functionality within the cell and if that cell needs downregulation because things are too amped up and ramped up with inflammation or oxidative stress, that same compound could read that signal to bring it down.

Now, that doesn't mean that it turns our cells into superhuman cells. It takes what we have to work with and works within certain threshold, right? So that's how I see it.

So more adaptogens aren't always better. It's very similar to melatonin, where it's like finding that sweet spot for the person to have that best response.

Okay, well, yeah. And it's always a joy to chat with. You always learn a lot. I know that you have some resources that I want to encourage people to get.

You speak just ever briefly about the resources. You bet. So it is a packet that is intended for both practitioners and non practitioners in which I give you some tools as it relates to phytochemicals for neuroendocrine and immune issues as well as the published paper that we had in the Nutrients Journal.

So for those of you who are a bit more curious, you're you like to know those mechanisms. We have that article that's built in to the the give away. Okay.

Well, yeah. Where do people find you? Do you have a website? I do. Very easy. It's my name. DNA, Mediacom, DEA and then a am I and ICOM. Everything's there.

And do you have an Instagram handle? Oh yeah, I do. My also my name and make it easy. Okay. And I follow you. I love watching your meals and you eating and your suppers and your day a day in the life of Dr.

Terri walls. I love seeing what you're up to. People occasionally complain. They complain that there's some political stuff in the background on my wall.

They don't want to hear anything about my politics and say, You know, I'm going to look at my life if you don't like my politics, that's fine. Just get my newsletter.

You can read my information. But if you want my life, you're going to see it exactly as it is. I'm not taking anything down. You just get to see how I run my everyday life.

That's right. And we want you to be you. And that's when we have their fullest expression and health and well-being. And people know that I'm completely authentic.

You are. You definitely are. That's what I enjoy when I'm with you. And just. I just very quick. When we ate together, when we had lunch together, one of the I think it was the RNA conference.

You walk the talk, you walk the talk. You even brought desiccated liver with you to that lunch. I mean, I was amazed by the diligence that you would go through to ensure that you were in full integrity and that you're doing every step of the way.

You know, and the reason I can do that DNA is because I've tried general neuralgia. If I get some of the wrong food, I will face pain turns on. And I have incapacitating levels of pain.

Oh, my goodness. And for the listeners to know what that feels like, imagine a cattle prod stuck cured by a couple. Should you be with about 10,000 volts?

I cannot hear anything for that moment. I cannot see anything for that moment. The world is white and the muscle tone in my legs drops for just a bit and my knees collapse.

I've not fallen yet, but it really gets my attention. And so I will never willingly eat foods that I know are at risk of turning that pain on. And so I'm always a bit anxious and eating food that someone else prepared, particularly now that I realize 20% of grocery items like gluten free have gluten in them and 40% of restaurant items labeled gluten free have gluten in them.

So I'm very cautious about what I'm eating when I'm away from home. Well, you walk the talk and I find you. You are a role model to so many people for so many reasons.

And just even at your conference, you had the hotel make separate food. We had the Wahls menu, right? I mean, that was brilliant. So thank you for your integrity, your consistency and being away.

SCHAUER In so many ways, Terry, it's it's an honor privilege. And I'm so grateful to have you being that beacon of light to so many people, including myself.

Thank you much, as always. It's such a pleasure chatting with you and I look forward to being at a conference together again. Much love to you and your family.

You too.