Pro-Oxidants, Hormetic Stress, and Anti-Aging Transcript

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Introduction and Guest Background

Welcome back to the Restore Your Mitochondria conversation. I'm your host, Laura, for Ontario. I'm bringing you experts to help you boost your energy and fix your health so you can build the life you love.

And today, my special guest is a friend of mine, doctor Miles Nichols. Hi, Miles. Welcome to the summit. Hello, everyone. Happy to be here. Yeah. We're so glad to have you here.

We're going to go for bringing you on to have some deep discussion, around my doctor, Andrea. Oxidative stress. So we're going to talk deep about the antioxidant defense system today and how that relates to mitochondria.

I wanted to bring you on here because you're such an expert about this, and you work with people in your in your clinic who have had mitochondria decline.

You're a functional medicine doctor specializing in Lyme mold illness, gut, thyroid and autoimmunity. And you coauthored How to Use Your Mind to Heal Your Mold and Lyme and Stress Resilience.

And you're co-founder of the medicine with Heart Functional Medicine Clinic. I love the name of your clinic. It's so good. And that's a call. Yeah, it's in Colorado.

And you also have the Medicine with Heart Institute that trains other doctors in functional medicine. And of course, you've been a featured speaker at national conferences, professional associations, podcasts and summits.

And you can add this summit to your resume now. And they just keep stacking up. Yeah. We just keep asking you back because you're such an expert. So thank you. Thank you for being here.

Yeah. Yeah. Thank you for having me. I'm looking forward. I think mitochondria is a topic that I've been passionate about a long time, and I'm glad that it's starting to get some attention in the space.

And people are realizing the link between mitochondria disease energy and so many things like oxidative stress. You've been treating mitochondria for a long time in your practice, and you're totally right.

It's now people the public is aware of mitochondria now. So now we're having summits and talks about this because people are interested in it. But it's not actually a new concept is it.

No it's not. And research keeps coming up with new diseases that are linked to mitochondrial dysfunction. So the list grows. And the things that we know for sure are linked with mitochondrial dysfunction.

But it's long been known that mitochondrial dysfunction plays a role in health, in energy and many disease processes in the body.

Oxidative Stress and Its Health Impact

And I'm fascinated by the whole history of multicellular life and how mitochondria plays into that history of life as we know as multicellular organisms as well.

Yeah, well, let's jump right in and let's talk about oxidative stress and why it is relevant for health and aging. Yeah. So oxidative stress is a big source of issue for the body potentially.

It's also a source of it's not all bad. I think oxidative stress gets a bad rap sometimes. And oxidative stress plays a role when when your body creates there's superoxide dismutase and then hydrogen peroxide.

A lot of people know what hydrogen peroxide is. You might have some in your cabinet and you know that it's anti microbial. And you can put it on a cut or something to prevent an infection from happening.

And your body will make hydrogen peroxide inside of cells and outside of cells in order to do things like if a phagocyte which is consuming something wants to get rid of an infection, then hydrogen peroxide will be part of what kills that infection.

So oxidative stress plays a positive role. But oxidative stress can also play a negative role. If it's not killing pathogens, it can impact. It can damage cells, it can damage DNA.

It can cause cell signaling problems where cells aren't proper, properly signaling to take glucose into the cell so we can. There's a link between oxidative stress and heart disease.

Many times because of damage to to cholesterol, damage to the lipids that are in the body, damage that happens to the cells and the cell lining. In particular, the vessel walls can collide with cholesterol that can oxidize, that can create plaques that can lead to heart disease.

The number one killer for today. So oxidative stress relates to heart disease. It relates to diabetes. It relates to some of the biggest disease processes today.

And it also relates to some of the more obscure things like mold illness and Lyme disease. There's many toxins and infections create oxidative burdens on the body.

And it is very frequent that I see people who are chronically ill with elevated levels of lipid peroxidase, elevated lipoprotein, little a all these are markers that that that tell us that oxidative stress is an issue and the person is not appropriately getting rid of the oxidants at, speed.

That would be helpful for their body. This sounds like a little bit of oxidative stress is actually beneficial to the body, but a lot of oxidative stress is where the problem comes in.

And I heard you say there's things that can cause oxidative stress. And then there's a problem of the body not being able to get rid of it. Exactly. Yeah yeah yeah yeah.

And and even thyroid function oxidants play a big role in thyroid function. That's part of how thyroid makes thyroid hormone is it. It uses hydrogen peroxide but it wants it outside of the cell and not too much inside of the cell.

So there's a lot of glutathione and selenium inside of the cells in the thyroid, preventing that hydrogen peroxide from damaging those cells. But the hydrogen peroxide outside of the cell is needed there to make thyroid hormone.

Okay. So we can't survive without a little bit of oxidative stress. Exactly. Yeah. Yeah. So how would somebody know if they're experiencing the negative effects of oxidative stress.

If it's too much if it's overwhelm on the body. What what's going to happen. Yeah. That's part of the problem is it's not so easy to know, at least in the early phases of oxidative stress, people can feel fine in the beginning when oxidative stress is occurring.

But certainly certainly there are some signs any physical injury, you're going to get some oxidative stress as the body in flames inflammation. It's going to signal oxidative stress there.

Some of those oxidants are going to be in the appropriate area that injury that are going to do some things positively there, but something's going to leak out and get into other cells.

And if there starts to be if there, if there, if there starts to be things like heart disease, or diabetes or a chronic infection like Lyme or co-infections, thyroid disease or a mold toxin illness, any of these issues or chronic inflammation, chronic inflammatory response, any of these are often coupled with oxidative stress.

Okay. And so how do you know when it's getting really bad. Yeah. So so certainly energy production can be affected. So people could feel they could feel tired.

They could feel like something's off. Easily winded. They could feel like there's they're in pain a lot because inflammation is significant and chronic.

They could feel like they're not thinking, well, they're sometimes even having headaches, migraines, muscle pains, joint pain that are significant and getting worse over time could be all signs that oxidative stress has become overburdened in the body, and obesity would be another one.

That would be a sign that oxidative stress is really causing problems.

Recognizing Oxidative Stress and Lab Testing

And in the most severe if if someone gets a cardiovascular event, a heart attack or, a stroke, then, you know, often there's been a long term oxidative stress process for, for heart disease.

It's people talking about cholesterol. And a lot of people know about cholesterol, but inflammation and oxidation are two elements that are extremely important and make the progression of atherosclerosis are a very deep part of that progression of how people get to eventually having a heart attack.

Unfortunately, some of the first symptoms can be maybe chest pain, maybe shortness of breath, but sometimes a bigger event like a heart attack, which is actually happened to my father when I was young, which makes me passionate about trying to prevent this and look for markers earlier in labs in order to to prevent this from happening.

Progressing when when it's at its earlier stages and people might not know that it's, so what I'm hearing is you might not have early signs. You might not. Right.

So working with a functional practitioner, if you suspect, you know, maybe you're not at the peak of your health anymore to get early detection from labs and, these, blood tests.

Urine tests. What kind of tests are you doing? Blood and urine both have markers that can help us understand if oxidative stress is playing a role on blood markers for the cardiovascular system, for heart disease, there's something called lipoprotein little A and lipoprotein little A is a good indicator of whether oxidative stress is occurring in the cardiovascular system.

So that's one I like to order on everyone, just as a preventive to screen people for seeing if oxidative stress is playing a role. There. In terms of a urine test, there's something called lipid peroxidase.

And lipid peroxidase is a great test. FDG is another one that's a good urinary test that's looking at oxidative stress. And then we can see sometimes signs of oxidative damage.

But those are some of the big direct looking at oxidative stress markers. I'm going to ask you in a minute about what we can do to help ourselves if these labs come up abnormal.

But first, can you talk about the antioxidant defense defense system and how it relates to mitochondria? And then we'll shift into what to do about it?

Yeah. So part of the way that the body deals with excessive oxidants is what's called the antioxidant defense system. And the antioxidant defense system is where the mitochondria are helping to reduce those that oxidative burden.

And there they're different ways in which the body recycles oxidants and changes things like lipid peroxidase into a less oxidative, thing or where it's where it takes the superoxide dismutase.

It's a very, very, reactive oxidative species. And then it reduces it into hydrogen peroxide that uses several. It use a couple enzymes and several nutrients that are needed for those enzymes.

And mitochondrial function plays a role in that. And then there's also the reduction of hydrogen peroxide into water. And that actually is also utilizing glutathione and selenium and mitochondrial function in order to get it back to water.

So energy production basically like when when there's excessive oxidative stress in the cells, when oxidants go into the cells, they can tell the cells don't uptake glucose anymore, don't make energy anymore.

Like don't do that because the oxidative stress is a sign that there's something going on that that would mean don't make energy. Making energy isn't the best idea at that point.

And so you need to deal with a pathogen. You need to deal with something going on in the system. And that then can unfortunately lead to lower mitochondrial production of energy.

It can lead to fats being oxidized outside of the cell, instead of going into the mitochondria and getting energy produced from them. So question Myles, help us make sense of this.

So if you have a pathogen and your body down regulates energy production, you're in my mind. You think wait there's a pathogen. Immune system needs more ATP energy to take care of it.

Explain to people why the energy gets downregulated. Because that's an important point. Yeah, because it is part of how the part of how the body fights infections is with oxidants.

It oxidants. Well, they're damaging to cells. They're also damaging to pathogens. So your body once when there's a lot of oxidative stress it wants to produce more oxidants in order to attack pathogens in some cases.

So hydrogen peroxide is very oxidative does kill pathogens. We know that from having it in our cupboards into the body is trying to go into defense mode by increasing oxidative stress and not by reducing oxidants as much.

So there's this feedback loop where the body is reducing energy creation, but it's increasing immune activation. It's increasing oxidants to deal with that infection.

So then it's not always healthy right. That's what I want to establish here is that it's a mechanism your body uses to fight chronic infection. But it doesn't necessarily help you actually becomes problematic with chronic and acute infection.

You know, you get tired, you know, your energy production goes down and the acute infection, your body creates a fever. It does the immune response, it does its oxidative thing, and you're over it fairly quickly.

Antioxidant Defense System and Mitochondria

And your body can then start making energy again and go into repair mode. But with chronic infections is where it becomes particularly problematic, because then you have longer term low energy production and longer term cells not uptake in glucose, and then glucose can rise in the blood.

You can have low energy and many other problems can arise from this. And so people might not always know they have a chronic infection. You can have I mean, you're fortunate if you know, you have Lyme disease or mycotoxins, mold intoxication, or if you have parasites or something that's hanging out there.

But there's a lot of people that have no clue this is going on. They just feel lousy. They just absolutely. And they're told when they go to their doctor's office, well, it's just probably aging because all your labs are checking out fine, right?

Yeah. Yeah, yeah. Unfortunately, many times until until they get a diagnosis, like something like diabetes or something like heart disease maybe, which is what you pay.

Yeah. I mean, at this point they've had some kind of chronic thing that's causing oxidative stress that way down the line. Now they have something that the allopathic medicine model recognizes as a problem.

And what's interesting is that many times I will see standard lipid panels looking normal. So the person doesn't have elevated cholesterol, but lipoprotein little a which it is a lipid.

But it's a it's a different lipoprotein. That is one that's showing us that oxidative stress is present, is often elevated for individuals who have normal cholesterol.

So in the normal screen for cholesterol and blood sugar, they're going to often miss lipoprotein little A in there indicating that there is oxidative stress happening.

And I find that all the time. And I also find that when glucose and hemoglobin A1, C look normal, that if we look at fasting insulin and fructose and, you know, if we put a CGM, a continuous glucose monitor on someone, we see that there are impaired responses for glucose getting into the cells that have begun, even though they're not showing as even prediabetes, but even people who have generally average of low blood sugar, they're getting these spikes up and down.

And that's showing cellular signaling problems, which we know oxidants can cause cell signaling problems. Okay. So now let's shift into talking about what to do about it.

So lots of things we can do, but let's let's go go with supplements here. I mean, I've had a lot of people talk about all the lifestyle things. There's so many, talks on this summit about all the things you can do, but let's dig into supplements, because they can help with the negative byproducts from oxidative damage and, cell signaling issues.

So which ones do you recommend? Yeah. So first I'll say it's important for the long run to identify the source and or sources of oxidative stress that that could be a nutrient deficiency.

And supplementation could directly impact the cause in some cases. For example if there is iron deficiency, then that can really actually improve the function of the antioxidant defense system.

So in plant based antioxidants are wonderful for this as well for up regulating the internal antioxidant defense system. But I do want to say it's important to find the cause if there are toxins or chronic infections or Lyme disease or, you know, something that is a bigger cause of oxidative stress, poor lifestyle habits, the poor diet, these things are important to identify and not just put a bandaid on this of increasing antioxidants and, and some of the externally antioxidants, some of the ones that are popular, like vitamin E, is a very, very strong synthetic antioxidant that unfortunately it can it can down regulate the antioxidant defense system of the mitochondria because it's doing the job for them.

And so there's this it does it is a strong antioxidant shown to be an antioxidant. But it actually won't improve the endogenous antioxidant defense system.

If we want to train for getting strong, if we want to do weightlifting to get stronger, we lift weights that are heavy to break down the muscle tissue, and then that signals repair and it builds the muscles up.

This is a process. It's called promises. And so they're actually things that some nutrients that are direct antioxidants like vitamin E and vitamin C and glutathione and but there are some that are actual mild pro oxidants.

They actually are creating superoxide like, like green tea and curcumin and poly phenolic compounds from grape seeds or from many other plant phytochemicals.

Supplements, Diet, and Mitochondrial Support

Any polyphenol that compound or phytochemical plant compounds from usually any brightly colored fruits and vegetables on the dietary front, or extractions from those fruits and vegetables can and and leaves and things like green tea are actually able to be converted in the body to get detoxified as if they're a toxin.

They get converted into superoxide. They become a mild pro oxidant. But they're a small enough pro. And just like lifting weights, is a small enough stress to the muscle, it doesn't like break the muscle tissue apart.

It doesn't rip it apart to where it can't repair properly. It it it stresses it enough to send signals to make it grow. And that's similar to like green tea.

For example, if you this there are studies that show that the amount of green tea that you get from drinking green tea or, or even from taking a green tea supplement will increase glutathione significantly.

But then if you keep going up in dose two doses that that that you, you know, most people wouldn't get, you'd be taking a crazy amount of green tea or you'd like, make a huge extract.

And you if you keep going up in dose, it actually becomes toxic. It becomes actually an oxidative burden that the body can't. It goes exceeds the too much of that.

Too much of a good thing is that what I'm hearing. Yeah. Yeah. The the dose is important. There's a U curve and and there's, there's benefit and then it tapers and there's actually detriment.

So so these plant based antioxidants of brightly colored fruits and vegetables, polyphenol compounds and and phytonutrients are these amazing zing. They're almost like exercise like weightlifting or exercise for the mitochondria.

They're they're they're saying like hey, kick into gear because one of the signals that that, that oxidants give is mitochondrial biogenesis. This is part of how this is part of how exercise works.

So when people exercise it creates inflammation and oxidants. And but it's at the right amount to what signals the mitochondria to reproduce. Biogenesis means reproduction.

So the mitochondria are saying, oh, we need to make more of us to deal with this oxidative burden. We need to make more antioxidants. Plant based antioxidants do the same thing.

They are a mild pro oxidant. They do stress the body a little bit in a way that says mitochondrial biogenesis start to re produce and make more mitochondria in order to have a better antioxidant defense system to deal with these oxidants that are not overwhelming the system, but that are telling the system or signaling the system.

But they need more mitochondria, more antioxidant defense. Okay, what else do you want to tell us about solving this problem besides, eating the right foods, doing the labs, figuring out what's happening so you can supplement correctly?

What else will support people? Yeah. So certainly things along the lines of doing other practices that can help mitochondrial function. There's in terms of supplementation, there are a lot that are that are good.

I just want to quickly say that like vitamin E in too high of doses, that alpha tocopherol I do think actually makes mitochondria a little more lazy. We know that vitamin C at very high doses right after exercise can blunt some of the beneficial, hermetic, stressful effects of exercise.

I like vitamin C a lot, but not right after exercise. And we know that that these plant based antioxidant compounds, things like curcumin and things like green tea extract and polyphenol compounds from pomegranate extract, these these are really amazing plant based antioxidants and lots of brightly colored fruits and vegetables.

Few cups of them per day could be really significant in building strength, like weightlifting for the mitochondria. And then exercise is going to be tremendously important as well.

And then being able and there there are other ones. There's CoQ10, there's glutathione. There's there are many other supplements that can be mitochondrial support supplements that also have anti oxidative components to them that can be helpful without doing what high dose vitamin E can do and that can support antioxidants system.

So what I what I do encourage people to do is to look at the, you know, look at labs if you can, if you have access to them, look at things like lipoprotein little they look at things like lipid peroxidase, FDG, those markers.

And then also look for dietary approach that integrates a lot of brightly colored fruits and vegetables. Consider supplementation with nutrients that are phytochemical, polyphenol rich nutrients and then exercise to help with mitochondrial function.

Sleep is incredibly, incredibly important. And and then there are specific practices there. There are best practices that will induce a mild hypoxia that will increase the oxygen carrying capacity and that will stimulate also mitochondrial biogenesis.

Cold exposure has been shown to increase your epinephrine a tremendous amount, 200 to 300% within just seconds of getting into very cold water. And that then can signal the mitochondria to reproduce because your body's saying I'm cold anymore.

Heat. Heat comes from energy production. There's a byproduct when mitochondria are making ATP energy that releases a little bit of heat, there's a thermogenic property.

So part of what there's there's fat that's negative for you. There's you know, a lot of fat tissue, visceral fat tissue and white fat has health detrimental problems to it in the adipose tissue can cause big problems of inflammation and swelling.

And it can lead toxicity of stress. But there's what's called brown fat, where the fat actually babies have more brown fat where that which means more mitochondria, it's more dense, densely packed full mitochondria and cold exposure can actually signal fat to start to reproduce mitochondria, to build more mitochondria and fat in tissue and muscles and in the body.

So cold exposure is a really interesting one that I like for stimulating mitochondrial whole body fat whole body crowd, super popular now. So I mean it's that people are doing this in cold plunges and yeah, yeah, we see places cropping up here and there for your cellular health, right?

And for anti-aging. Miles, you've talked a lot about root causes. You know, we've talked about Lyme and mycotoxins, infections like parasites.

Root Causes, Genetics, and Gut Health

Any other additional root causes that may play a part of oxidative stress? Yeah, I want you. Yeah. I won't dismiss genetics because they do play a role, but they're over overstated.

So I don't want to overstate. Genetic predisposition does play a role in, for example, lipoprotein little elevation or or superoxide dismutase, production and an ability like catalase to break it down.

The enzymes in the body, you can have what are called snips or single nucleotide polymorphisms. And in some of the enzymes that are needed to reduce oxidative.

I actually have some of those myself. I have some, some, some snips in in part of the enzymes that break down superoxide dismutase. And so that makes me need a little bit extra antioxidants and be a little more subjected to oxidative stress burden as compared to the average person.

So I will say genetics play a role. But even though genetics play a role and we do see lipoprotein little elevation, for example, not tied so directly to dietary approaches.

And tied a little more to genetic predisposition. There are direct intervention trials using high dose vitamin C acetyl l-carnitine and niacin. I don't like niacin for reasons I won't go into right now, but but high dose vitamin C and acetyl l-carnitine, which is also mitochondrial, support a kilo carnitine is needed for fat to get into the mitochondria instead of being oxidized outside of the cell.

And I see a lot of actually people who have urinary metabolites that are suggesting that fats being oxidized outside of the cell and contributing to oxidative burden instead of contributing to energy production.

And we want it to go into the mitochondria to produce energy. And acetal carnitine is one of the factors for that. So some some of the oxidative stress burden is due to either a genetic predisposition, a dietary reason or some other reason why there's insufficient carnitine in order to shuttle the fat into the mitochondria in order to make energy.

And that is contributing to a state of stress burden. So. Dietary meat is the biggest source of carnitine, but there's many reasons genetically and other and absorption and gut dysfunction as to why people might not be absorbing, metabolizing or utilizing that very well.

So so so gut dysfunction is another big one that I would say is is really, really important genetics and gut issues. Because with gut issues you're not going to absorb as well.

And, that absorption of nutrients can play a big role. And we know that certain nutrient deficiencies are connected with small intestinal bacterial overgrowth.

And we know that certain gut dysbiosis can cause big signaling problems and issues with B vitamin production. And some of the some of those neutral. There are nutrients involved in antioxidant defense.

There are many minerals involved in the antioxidant defense. So selenium I mentioned already is one and manganese and and there are several other iron is involved.

There are several other minerals involved. And in the oxidative antioxidant system defense system. So gut dysfunction is a big, big problem that I think contributes to a lot of people's issues with oxidants.

Yep, yep. I always start with the gut. That's where I go first when I start working with people. I'm sure you do the same. Yeah, yeah. So this has been fantastic.

Your knowledge is so vast. I like, literally want to open your brain and pour it into mine. It's so amazing. Every time I talk to you, it's like I could get lost in Miles words.

I know the practitioners viewing this summit are going to love this talk because it's so, it's it just really helps connect the dots. And if you're a consumer in, health care, then you've got a lot of pearls from doctor Miles on what to be looking for when you're working with your practitioner.

Working with Dr. Nichols and Closing

Now, can you share with us, how people can get Ahold of you, how people can work with you? You do work with practitioners. You do work with patients. Let us know if you have virtual offerings for people.

And, how that works. Yeah, absolutely. Best way to get Ahold is to go to the website medicine with heart.com. There is the ability to look at our blog.

We have free materials there. There's also a link to book a free discovery call with one of our staff to find out more about the clinic. And we do work with people all across the United States.

So and even some people outside of United States, with some caveats about labs and, and supplements. But, we work with people worldwide, and then the practitioners can go to mind body functional medicine.com and mind body functional medicine.com is where medicine art institute training programs, clinician training programs to be able to learn functional medicine and be able to treat complex chronic issues or just get started in functional.

And so we have two tracks that are for different practitioners who are at different places in their functional journey in mind body functional medicine.com is where to go for them.

Medicine with heart sitcom is for the clinic for anyone who would like care and or to get free resources like our blog. Oh so amazing! Thank you so much for being here, for imparting your wisdom and for what you do out there in the world.

The world is a better place because you are in it. Well, same for you and I really appreciate what you're doing with this summit and your practice as well.

Thanks, Miles. You take good care. Bye now. Right.