Introduction to Mitochondria and Healing

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So in the brain, it means maybe you don't make enough serotonin, maybe you don't make enough dopamine, maybe you don't make enough norepinephrine. Maybe you don't make enough of the protein that re-uptakes all those things.

Maybe you affect the transport channels, you know, the little things along the nerves that allow the nerve impulse to go down. So all that stuff, all that is controlled indirectly by mitochondrial function.

This is Doctor Talks, real talk from real doctors on the issues that matter to you most. Welcome back to Lime Bites, Rebuilding Immunity, Reversing Inflammation and Redefining Recovery.

Today, we're diving into a critical yet often overlooked foundation of healing, mitochondrial function and its role in recovery from complex chronic illness.

Joining me is someone that I deeply respect for his clinical expertise and tireless advocacy for children and adults with chronic conditions, Dr. James Newenschwander, affectionately known in our community as Dr.

New. Dr. New is a physician duly board certified in both integrative and emergency medicine. He's the founder of Bioenergy Medical Center in Ann Arbor, Michigan, where he spent decades helping medically complex patients uncover and treat the root causes of their illnesses.

He's also the president of the Medical Academy of Pediatric Special Needs, or MAPS, where he plays a central role in educating practitioners across the country on functional and integrative approaches to pediatric chronic illness.

In today's episode, we're talking about something that lies at the heart of energy production, immune regulation, and cellular communication, the mitochondria.

You'll hear Dr.

Dr. New's Path into Integrative Medicine

New break down how mitochondrial dysfunction contributes to many of these symptoms we see in Lyme and other infection-driven conditions, including fatigue, cognitive issues, and poor immune resilience.

We'll explore how mitochondria influence everything from gene expression to recovery speed and what you can do to begin supporting mitochondrial repair in even the most complex cases.

So whether you're a practitioner trying to better support your patients or a listener on your own healing path, this conversation is packed with practical insight and deep clinical wisdom.

This is Lime Bytes. Let the true healing begin. Welcome, Dr. New. Thanks so much for joining me. Thank you so much. Mariah is a pleasure to be here. Well, thank you.

So tell our listeners a little bit about why you do what you do. Well, I mean, the short version of it is I went to medical school to learn how to cure people, how to heal people, and they don't teach you that, believe it or not.

I sort of had an epiphany in the middle of my residency that, like, there's this whole world of healing they didn't teach me about that caused me to leave the mainstream medicine, pursue a course of integrative medicine.

And that was back in 1988, I think, is when I founded my clinic. And the tagline from my clinic was, you know, healing illness at its source. It was trying to get under the surface and find out why, you know, rather than just here's the symptoms, here's a pharmaceutical, put the two together, that's how they practice medicine now.

And then somewhere in the early 2000s, around 2007, I got dragged, as I like to say, kicking and screaming into the world of autism and, you know, chronically ill children as well.

And that was a huge life changer. I mean, I'm so glad that happened. my wife's fault. She's the one that made me do it. But, you know, it was a matter of reconnecting me with my love of biochemistry and an understanding of why we have the things that we have.

And, you know, today's topic, mitochondria, I can remember in 2008, sitting in a room, the next lecturer was going to be a man named Richard Deeth, who's a PhD.

He was going to talk about mitochondria. And I just thought there at that point, it's like, well, it's going to be a waste of my time. I know about mitochondria.

In about three sentences into his lecture, I realized, I don't know diddly about mitochondria. And it's been a learning curve ever since. And the importance of it with disease management is just critical.

And I think most of us are way behind the curve on what the mitochondria do and how we can manipulate that. Yeah, it's true. I think most of us are just taught it's the powerhouse of the cell.

It's an energy generator, but it really lies at the heart of every single function of the cell and of the body. So I've heard you talk many, many times before, always love listening to you.

But you say that many of the symptoms of chronic Lyme disease and similar other inflammatory conditions are tied to mitochondrial dysfunction. So let's start off by talking about that.

Can you explain how the cell danger response fits into this scenario? Sure. Well, you know, the cell danger response is basically an effort of the cell to protect itself or at the very least protect its neighbors.

So when a cell, I mean, the classic would be an infection. So if a cell gets infected with a virus, bacteria, whatever, it's going to release danger signals.

into the environment around it and it's going to warn its neighbors that there's problems.

Cell Danger Response and Chronic Illness

The neighbors then kick into this cell danger response and what happens is they divert normal electron flow and oxygen consumption from energy production into just creating a high level of oxidation inside the cell.

So normally cells will generate all these extra hydrogen ions, create all this oxidative stress, but then it will normalize that and in the process allowing those electrons to come back into the inside of the mitochondria.

That's how we make energy. So with the cell danger response it stops that and it allows those things to build up. So it creates this very very hostile environment.

Most Organisms that infect us don't do well with oxidation. I mean, that's part of what the immune system uses to fight infection. They will stick the organisms in these little vesicles and then pump peroxide or something like that in the vesicle to kill it because they don't do well oxidation.

The cell itself can survive, but these organisms can't. So the problem with that is that If you're not making energy, if you're not making ATP, which is what the cell runs on, then nothing's going to work the way it's supposed to.

So, you know, your brain doesn't work. And we've all had that experience where, you know, we're getting sick and it's like, man, you know, you ask a simple question.

Can you ask me that tomorrow? I, you know, it's like, I can't even get my brain to work enough to answer your question. And you're exhausted and you can't figure out what's going on.

You wake up the next day and you got a runny nose and you're sneezing and maybe you got a fever. It's like, oh, OK, I was getting sick. That's the cell danger response.

And it's not just our brains. That same process is happening in every cell that is affected by this. So if it's an immune cell, then it's not going to work all that well.

Now, cell danger response is very good for getting over acute things like infections, right? So it's supposed to be there for two, three days. That's really the initial cell danger response that creates all that oxidative stress and messes up ATP.

There's a phase two where it's designed just to replace cells. So you actually use this process of cell replacement where you use oxygen, but you're not using the Krebs cycle.

And then, you know, that's a classic pathway that cancer cells use. So when things get stuck in phase two, that's kind of the way cancer cells work. And then phase three is where the cells have to reconnect with each other.

Our cells are very connected. So a cell doesn't just communicate with its neighbor, it actually exchanges cytoplasm. You know, so that'd be like you and me hanging out with IVs in our arms and we're exchanging plasma, right?

Fortunately, we don't do that. That'd be really weird. But that's what cells do, right? So they have to reconnect and become whatever cell they're supposed to be, a liver cell, a kidney cell, a lung cell, an immune cell.

So that's the cell danger response. When we get stuck in one of those phases, that can describe almost all the chronic illnesses we see. And that's really what was transforming about understanding that cell danger response.

You know, if we get stuck in phase one, we're just going to have this ongoing oxidative, inflammatory response, we're not making ATP. These are the people who can't get out of bed, right?

They don't have enough energy for their muscles to function and if they get up and walk across the room, the muscles are so exhausted they have to go sleep for three hours to recover.

Right? You know, phase two, like I said, you get stuck in phase two, that's cancer, that's proliferative disorders. And you get stuck in phase three, if the cells don't reconnect, you know, that's autism, that's most of the chronic, you know, these chronic inflammatory response syndrome type things, your mold patients, you know, and most chronic Lyme patients would fit in this category as well.

But it's going to be pain in the muscles because they're not functioning the way they're supposed to. It's going to be immune dysfunction because they're not functioning the way they're supposed to.

It's going to be brain fog, you know, all the all the mental symptoms we see with our clients and even brain inflammation where we're talking, you know, I mean, that's what a lot of autism is, but it's also what a lot of mental illnesses, you know, schizophrenia and a lot of anxiety and depression.

It's brain inflammation that's driving it. And all that stuff can be linked back to that cell danger response. Right. So it sounds very similar to like the inflammatory cytokine cascade where it's a perfectly normal response.

It's appropriate in an acute situation to heal an injury or to kill an infection. But when it becomes chronically elevated, it alters the immune system and all of these things that then keep you stuck like in this chronicity.

So question. Do you think that it is a state that the body gets stuck in post infection or is it something that an active infection is driving or is it both?

Well, that's always difficult to figure out. And this is, you know, I think, you know, I'm one of these people where, you know, unfortunately I was trained with the bugs cause disease theory of medicine.

Thank you, Louis Pasteur. But, you know, the reality is almost never does the bug cause disease. It's the body's response to the disease that causes the symptoms, right?

So, you know, that we describe as the disease. It's the body's response to the infection that does that or the body's response to the toxin that does that.

So, you know, the body's response is always going to involve the mitochondria. And you have to remember the theory of mitochondria is that these are bacteria, right, that were captured at one point because they had the ability to create energy out of oxygen.

So when oxygen showed up in the atmosphere, that was when There were bacteria that learned how to use oxygen. They actually were able to dominate the environment, but other life forms were able to incorporate them and then use them.

So when you think of mitochondria as bacteria and the evidence there, you know, mitochondria have cardiolipins, which is a very specific form of a phospholipid that No other cell membrane has, right?

We don't have it in our nuclear membranes, our ribosomal membranes, our cell membranes, but we have it in our mitochondria, and particularly in the inner mitochondrial membrane, which is where we make energy.

And pretty much every bacteria has cardiolipins. So the idea is, OK, this is a bacteria. When you look at what mitochondria do, They act like bacteria.

They divide. They elongate. They get short and plumpy. They change their character depending on what kind of stress that cell is under. So again, it's not just that they're there to make ATP, the powerhouse of the cell.

They're not just there to do that. When we have an infection or when we have a toxin, the mitochondria physically change. And then you have the whole cell danger response on top of it.

They're not working the way they're supposed to. So back to the question of, is it a response to the infection or is it the infection? The answer is yes.

It's not that you can differentiate those two things. Because any ongoing threat to the cell is going to do that. So if that threat is an unresolved infection, yeah.

Infection, Toxins, and Mitochondrial Dysfunction

If that threat is an organism within the cell, but on top of that you have a mold toxin, or you have lead, or you have some environmental chemical, or plastic, or something like that, then it's the combination of those things that are going to create the problem.

I sort of take issue when somebody says, oh, I have something like chronic Lyme, I have chronic Epstein-Barr, I have chronic whatever. It's, you know, particularly things like Epstein-Barr.

I mean, we all have that virus, right? It's like back in the day, we all had chickenpox. We all have the varicella virus in our body. It doesn't mean that we have chickenpox, right?

We have the virus, but we don't have the disease that goes along with it. So, you know, it's the same issue here with chronic Lyme. Do we have that spirochete in our body?

Maybe. You know, I mean you can take a cell and you'll find atypical bacteria in every cell in every person's body that you check. Right. Does it mean that's what's causing the symptoms?

Right. Well, and I think that there are a lot of people running around that have Borrelia in their body that are functioning just fine because they maybe aren't living a completely toxic lifestyle and they don't have maybe immense amounts of stress and their immune system is functioning well because I have a lot of patients and, you know, I was one of these people, I lived a very, very long time with Lyme and had no idea and, and functioned pretty well.

And it wasn't until, you know, getting other infections and going through a really stressful time in my life where everything kind of like went to shit.

And that's when all of my symptoms came out. And so I think, you know, you're right. It's more, it's the state of the terrain of the body, not what viruses, bacteria, parasites, et cetera, are living there because we're all riddled with all of these things.

I mean, I probably had Lyme when I was 16 years old. Now I'm ancient enough that that was like a year after Lyme was described. Okay. So, but that's why I'm maintaining a relationship here, Mariah.

Because if my life goes to hell in a handcart, and that thing reactivates. I need a good blind doctor. Oh, you'll call me. I'll call you. All right, but in all seriousness.

So now let's take that more specifically. Let's talk about why the mitochondria is so important for brain and immune function specifically. Right. So, you know, one of the things they've found is that the mitochondria, you know, obviously making ATP without ATP cells don't work.

And it doesn't matter what kind of cell it is, whether it's an immune cell, a brain cell, a liver cell without ATP, they're not going to work very well.

But the mitochondria also has a lot of signaling and, and very specifically mitochondria are involved with epigenetics. So that's the expression of DNA.

So if you. whatever it is you need to do, you have to make proteins, you have to make compounds, you have to translate and transcribe your DNA in order to do that.

And it turns out that there's a lot of signaling that goes from the nucleus of the cell to the mitochondria, so it can affect how the mitochondria work, but the opposite is also true.

The mitochondria has its own DNA, And particularly, there's a lot of DNA, we call it non-coding DNA, because we don't know what it codes for. But it turns out that chunks of this non-coding DNA have a huge impact on how cells work.

So again, the nucleus of the cell can make non-coding DNA and affect the mitochondria, how much oxidative stress and all that stuff is going on there.

But the mitochondria can make non-coding DNA to affect the nucleus and which proteins are being expressed and that sort of thing. So again, if the mitochondria are toxic or under too much stress or whatever it is, then the whole system falls apart.

And this is happening cell by cell. So within the brain, the brain burns more energy per capita than anything else in the body, right? It's 1% of our body weight.

Maybe for you, it's 2% because you're so smart. But, you know, 1% of our body weight, but it burns 20% of energy, right? It's 20% of our energy goes to our brain, not to our heart, not to our muscles, but to our brain.

And so anything that's going to impact mitochondrial function is first and foremost going to have an impact on the brain. So if you have anything that's affecting that mitochondrial function, whether it is a matter of making the ATP or it's the signaling, the cells aren't going to work properly.

So in the brain, it means maybe you don't make enough serotonin, maybe you don't make enough dopamine, maybe you don't make enough norepinephrine. Maybe you don't make enough of the protein that reuptakes all those things.

Maybe you affect the transport channels, you know, the little things along the nerves that allow the nerve impulse to go down. So all that stuff, all that is controlled indirectly by mitochondrial function.

And that's really the crux of what most of us don't understand is how critical the mitochondria is for all of the cell function, right? And then you get into things like, you know, what's our brain made of?

It's made out of phospholipids for the most part. Where do we make phospholipids? We make these in the peroxisomes. What do the peroxisomes need? ATP.

All right. So, you know, proxasomes are very frequently right next to the mitochondria because they need that ATP. And then also, you know, when we make our fatty acid change, you know, how do we make a chain longer?

We added two carbon fragments. Where's that coming from? Acetyl CoA. Where do you get the acetyl CoA from? And it's the same with alpha-ketoglutarate and all these Krebs cycle intermediates.

We just look at the Krebs cycles, this is how we make energy. Yeah, but that's also where we get a lot of the building blocks that we need for our proteins or that we need for our fatty acids.

And we don't consider that either. So again, the health of those mitochondria, and I really believe, because there's so many mitochondrial poisons, I mean, you know, you want to waste an entire day of your life, just look up medications that are mitochondrial poisons.

It's pretty much the entire armamentarium of what we use. And it's the same with environmental toxins. So a lot of these environmental toxins will exert their toxicity by screwing up mitochondrial function.

And remember, these are bacteria. So what happens when you take doxycycline or whatever for your line? Right. Right. I mean, you're not just treating that spirochete.

What are you doing to the mitochondria? Because at the end of the day, the mitochondria is a primitive bacteria that has its own DNA and its own function.

And what happens when you use an antibiotic? That's a very, very good point. Not something that I've actually thought about before. No, I mean, this is where most of us are at.

I mean, you've been in this game a long time. I've been in this game a long time. And we still learn new stuff about how important this is. You know, the powerhouse of the cell.

Great. That's a great thing to know about mitochondria if you're in 10th grade in high school.

Why Mitochondria Matter for Brain and Immune Function

Right. But, you know, it's so much deeper than that. And that's why I think a lot of the benefit of what we do is because we alter mitochondrial function first and foremost.

Because I really believe, I mean, my whole theory of wellness is the body is designed to be well. If the person has symptoms and the body is not well, something is preventing wellness from happening.

I don't have to push somebody to wellness. I have to remove those barriers that are preventing them from getting well. Is it mycotoxins? Is it environmental chemicals?

Is it plastics? Plastics is a whole world in and of itself that terrifies me. Is it poor nutrition? Is it EMFs? There's another kind of situation, right?

You know, I'm sitting here staring at a computer. You're right next to a nice electromagnetic field generator there, a microphone. You know, what does this do to us?

What does this do to our mitochondria? You know, we're bioelectric beings. I mean, you know, electron flow. What do you call that? Electricity. You know, that's how we make energy, right?

And all these fields affect that too. So there's so much at play here. and diving into this stuff and understanding this and incorporating this. Like you said, either into your practice, if you're a practitioner, or into your life, if you're an individual, that this is a big part of how you get well.

It is. And it's looking at all of it. I often refer to the straws on a camel's back. Maybe it's not one of these things isolated in a vacuum, but it's the continual bombardment and the total of all of these various things on our bodies.

So talk a little bit about how does all of this affect the recovery and treatment outcome with a patient that has some sort of complex chronic illness or infection?

Well, like I said, get going, we talked about cell danger response, you know, I think it is the reason why they're chronically ill. You know, so again, if you can, you know, wave the magic wand and fix the mitochondria overnight, you know, that person's probably going to get better in 30 to 60 days, you know, I mean, that that's sort of the timeframe.

Now, I don't have a magic wand. I like to say to all my patients, I left two things at home today, my magic wand and my crystal ball. You want to borrow mine.

Yeah, I know. I don't know why I just don't keep them in my truck so I could have it when I need it. But the trick is to reverse the things that are creating the mitochondrial dysfunction in the first place.

And that is sort of the skill set that we all need. is how do you identify, is it a nutritional element? Because the Krebs cycle uses a bunch of B vitamins, but the electron transport chain, what do we got?

We have iron, we have copper, we have CoQ10, we don't have that many nutrient things that we can do to work on it. But really for the mitochondria, unless you're born this way, and there are people born with mitochondrial dysfunction, a lot of kids, 25, 30% of kids on the autism spectrum, have some degree of mitochondrial dysfunction, but even in them, most of that is environmental toxicity.

So I'll look at nutrition, I'll look at B vitamins, particularly B1, B2, B3, those are the important ones for the Krebs cycle, but I'll look at coqueton, I'll look at iron, copper, that sort of thing.

But the big thing I'm going to look at is toxicity. Is there some environmental toxin? Is there some man-made toxicant? Is there a medication? Is there something that's interfering?

And then whatever treatment I'm going to use to treat the Lyme, I want to make sure that I'm not necessarily making that worse. Now, sometimes I do it on purpose.

I mean, something like Dapzone. Yeah, I'll use Dapzone, but I'll tell the patient ahead of time, you're gonna feel like crap when you take this, right?

You know, because it'll wipe out mitochondrial function for the time that you're on it. But again, are there things we can do to optimize the toxicity?

Can we detox that patient? And you well know, I mean, that's sort of one of the major limbs of what we do when we're treating chronic anything. Right.

Right. You know, how do you treat chronic illness? Detox. And I'm being generic here because you can't say, oh, do this or do this. You have to customize it to what's going on with the patient.

You've got somebody living in a moldy house breathing mold toxins. I wouldn't waste my time doing incubation. You need to get the hell out of that house.

You need to remediate. You need to bind all those mold toxins, blah, blah, blah, blah, blah. And then maybe we can talk about Lyme treatment because it's not going to work well.

And I definitely wanna get into as deep as time allows, you know, what the treatment is for the cell danger response and to kind of like reboot and heal and rebuild the mitochondria and its function.

But before we go there, how do you decipher? Like what testing do you do? What sort of analysis do you do, you know, to determine if it's mitochondrial dysfunction that's at the heart of it, or do you kind of just assume?

Well, I try not to assume. For me, the core of my workup is usually going to be an organic acid test. You can look at the Krebs cycle intermediates. There are certain markers, like a high succinate, a high malate, a high citrate.

If any of those intermediates are high, there's a reasonable chance that there's toxin-induced mitochondrial dysfunction. So that's one of the things you can do.

The second is, in this day and age, you can actually measure the electron transport chain complexes. So there's complex one, two, three, four, and five.

You can measure one through four and see what they look like. So that test will tell you it measures citrate synthase. That's the first step of the Krebs cycle.

So that is a stand in for how many mitochondria you have. So if your citrate synthase is two, three times normal, but your complex function is 20 or 30 percent of normal, then you know you have a major mitochondrial problem.

And what tests do you use to analyze that? There is a, it's called a mito swab that does that. It's, it's actually nice cause it doesn't involve drawing blood.

So I do this on a lot of my kids that have autism. Cause like I said, about 30% of them will have an abnormal swab. All right. And you can, you can look at just complex one and complex four, but the fancier way to do it now is to do all four of them.

And that will determine if you have mitochondrial dysfunction. And the second thing is, when you do these organic acid tests, you look at an organic acid test and you go, that looks toxic.

Testing for Mitochondrial Dysfunction

And I mean, that's a whole residency in and of itself. Any of the companies that do these organic acid tests usually have pretty good webinars, excellent webinars, because I know I've done some for them, that will tell you how to recognize toxicity on the test.

So you want to know where the mitochondrial function is, you want to know where the toxicity is. Because if a person looks toxic, we can talk about how to treat mitochondrial dysfunction.

But the number one thing is remove the toxicity, remove the toxicity, remove the toxicity, right? I mean, you know, if you treat mold toxic patients and you're six months into the treatment and they're taking all your supplements and, you know, I'm not feeling any better and I'm doing this and I'm doing that.

It's like, have you done anything about the mold? Well, no, I haven't remediated yet. It's like, if you don't get out of there, you're not going to get better.

And I think if the mitochondria is not functioning and the cell is not functioning and there's all this toxicity there, and then you go in and you try to replete these nutrients that are deficient, a lot of times you'll make the patients feel much sicker.

So the body isn't like the state of the cell and the state of the mitochondria. You can use elephant doses of these things and it's not going to let it into the cell if the cell is not functioning properly.

And just again, back to the tree hugger approach to medicine. I mean, it's really a matter of any symptom the body has. We don't have that symptom in order to be miserable and die.

That's not why we have that symptom. It is the body's attempt to heal whatever is there. And our job as clinicians is to try and understand How does that symptom translate into biochemistry?

And then what can we do about it? And, you know, my premise is much of the symptoms we see with chronic illness is really related to mitochondrial dysfunction in some way, shape, or form.

And especially, I mean, when you take into account, and the stuff with the epigenetics is relatively recent, I mean, there's the last few years that they've actually been able to identify the crosstalk between the nucleus and the mitochondrial DNA and how they influence the expression of each other.

And again, if the nucleus can get the mitochondria to make more because again, the genes in the mitochondria are mainly for the electron transport chain.

So if they can mess up that electron transport chain, and by doing that, create more oxidative stress, or in the cell danger response, we call it oxidative shielding, but create more oxidation within that cell, then yeah, the epigenetic regulation of gene expression is going to have an impact on how you feel.

You know this is really where I think some of the newer data is coming through where you know you just the more you learn the more you realize how critical these things are and remember you know a brain cell may have a thousand twelve hundred mitochondria in it right so it's like oh my god the cells infected with bacteria yeah we call them mitochondria okay so what is your approach to dealing with all of this can you walk us through it Yeah, yeah.

Well, I mean, you know, like I said, for starters, detox, detox, detox. So that's going to be cleaning up the environment, cleaning up the diet, cleaning up the water, the air, EMFs, if they're a problem, you have to clean that up.

So that that like, you know, that's a whole month of lectures to discuss that, but you have to clean that up. The second is just to make sure that there's adequate B vitamins.

Again, B1, B2, B3 are critical for the Krebs cycle. You want to have B6, B12 folate around, but you also want to make sure you have adequate CoQ10. Now, if I'm worried about mitochondrial function, you know, you can measure CoQ10 levels, and the normal range will be, depending on the lab, let's say 0.7 to 1.2, 1.3, something like that.

When you're dealing with mitochondrial function, you want to push that much higher. So I'm typically looking for CoQ10 levels over three or even over four.

So when you're doing CoQ10, you know, again, Typically, I'm trying to do the ubiquinol version of CoQ10, but

regardless, if you're doing CoQ10, you usually have to do hundreds of milligrams, so 200, 300, 400 milligrams to get your levels that high.

Treatment Strategies to Support Mitochondria

Now, they still allow me to order blood work and prescribe medication, so hallelujah, praise the Lord. I check levels, right? Because I want to make sure we're high enough, right?

That's one. The second is, like I said, you need to make sure they have adequate copper and iron. There's a lot of people that are chronically ill that are low in both of those things, mainly because these things also affect the way the digestive tract works, and then you've got a dysfunction of the microbiome, you're not absorbing your nutrients the way you're supposed to, you know, that's a huge part of my practice as well to get that stuff balanced, but you have to get the gut balance and get those nutrients, make sure that's okay.

The third thing is really hyperbaric oxygen. This is another thing that I use a lot for my chronic patients because hyperbarics, and it doesn't have to be high pressure.

You can use a home chamber. A 1.3 atmosphere chamber will help mitochondrial function. There's studies out there showing it reduces inflammation, but it actually improves mitochondrial function.

So some of these kids, because I've got some of these kids that have genetic mitochondrial disease. Right. And you can treat them with soft chamber hyperbaric.

So hyperbaric is always something to consider. I know it's expensive. It's out of reach for a lot of people because of the cost. But again, it's something worth trying.

And what I tell people is invest the money, do it intensely for a month. If you feel better, you know, go rob a bank or something and get one in your house.

Right. Okay, I'm kidding. Let me ask. No, I know you are. Let me ask you this, because this is a question I often get asked, is there you know, because most people who can afford to do it and say they're going to do their 40 hours and 30 days, you know, if they're going to do that one month of intense HBOT, where's the best part in treatment to do it?

Well, after detox, you know, I, and I don't want to say it that way necessarily because detox may take you five years. So I'm not saying wait that long, but you know, I would get into the detox mode for a couple of months before I necessarily invested in that.

Because again, if the, if the mitochondria just shut down because of toxicity, you can do hyperbarics to the cows come home. It might help, but it's, you know, it's just not going to be that effective.

So if you're going to invest the bucks, detox first, then do a hyperbarics after a couple of months. Okay. Yeah. I usually suggest doing it somewhere like halfway through, you know, not that we have that crystal ball and know where halfway is, but you know, once we kind of have all the things on board.

Yep. No, I'd agree with that. And then the, you know, the other big thing there, there are some nutrients that I think have been game changers. Methylene blue is one of them.

You know, there's pluses and minuses. I mean, you have to remember, this is an antibiotic. This is a man-made chemical. This is not something that nature gave to us.

But to me, it's something worth trying, at least over the short run. I'm not a big fan of using it for, you know, months on end, but I've had people, you know, that were bed bound and are now functional because they went on methylene blue.

So methylene blue is one of these compounds that, you know, it's got methyl groups on both ends of the compound. So it helps with the methylation process.

It's an antioxidant. It helps take down the oxidative stress inside the cell. It acts a lot like glutathione, even though the structure is different. So that's a big one.

And then, again, when we talk about detox, it's not just getting rid of the stuff in the environment and working on the gut and that sort of stuff, using binders, but it's also the liver, like the glutathione, the milk thistle, those kinds of herbs, because you want to have the liver on your side as well.

And then, you know, I don't know if any of this stuff is going to pan out or not, but I'm also very interested in DMSO because, again, it's a, you know, methylene blue, you've got methyl group and then you've got structure and you've got methyl group.

With DMSO, which you have sulfur, methyl, methyl, and then an oxygen. So you still have those methyl groups hanging out there, right? You know, would that benefit mitochondrial function?

At this point, I don't know. But I've had some decent success at least bringing inflammation down with that stuff. So that's another one of those compounds that I'm looking at to help the mitochondria.

And then at the end of the day, anything you can do to optimize the nutrients going into the mitochondria. So the mitochondria are going to work best most efficiently off of the fatty acids.

So again, sometimes you have to do radical things like doing a ketogenic diet or something like that that's just going to feed those ketones into the mitochondria or using carnitine, which You know, the function of carnitine is to transport those fatty acids from the cell into the mitochondria.

You know, that's another big mitochondrial supplement that we use. But it's, it's again, customizing what you're doing for the patient sitting in front of you.

The tools are not that great. It's not like we have the magic, you know. I wish methylene blue was the magic cure, but it's not, but it's just another tool in the tool chest.

And the most important thing, and this is, you know, I'm sure you have this experience as well. If you don't detox, this is not going to help you, right?

You know, don't start halfway into the treatment program when you haven't done the groundwork. on that. I think that's, that's a big problem. And then, you know, there's other things out there.

I mean, you know, I've had a lot of success using the, the platelet-rich, IV platelet-rich plasma, where you're actually shutting down the inflammation by using a person's platelets.

Because again, if you're shutting down that inflammation, it allows the mitochondria to bounce back. And that's been another game changer. Works great on kids, worse on adults, you know, as I think it was at a hyperbaric oxygen conference.

Somebody was presenting and I asked them about, you know, stem cells versus platelets. And the guy said, you know, I'm almost 65. The guy said, well, the trouble with using platelets from a person like yourself is you're using 65 year old platelets.

You're just not going to work the same as, you know, umbilical cord stem cells or something. But still, those are the tools that you want to work on. And, you know, most of it is what can you do to take the load off the mitochondria?

And then you have your CoQ10, your B vitamins, your iron, your copper, your hyperbaric, your methylene blue, and possibly DMSO. You know, those are things that you can throw into the mix to see if you can get those

mitochondria functioning better.

Okay. So if you're working with someone, I do a lot of intracellular testing for nutrients. And I've been seeing like this theme, right? Where I'm sure you see it too.

You have patients come in, they are on an ungodly amount of supplements. They're taking everything. And then the test that I use gives you a serum level.

And then it also gives you this intracellular level or cellular level. And a lot of times serum levels would be very, very normal to high. And then we have the cellular levels that a lot of times are deficient or at least borderline deficient.

Does this fit into what you're talking about with the cell danger response? I know that phospholipids in the cell membrane and not doing their job can keep the nutrients from coming in, but do you see this in your patients?

Intracellular Nutrients and Cell Membrane Transport

And if you do, how do you deal with it? Besides detoxing, obviously. We have to detox, we have to do the oil change of the cell, you know, all of those things.

Right. You know, again, I think, you know, I'm glad you mentioned that because a big part of Dealing with mitochondria is also dealing with phospholipids, you know, working with plasmalogens, working with the phosphatidylcholine, phosphatidylethanolamine, those kinds of things.

And, you know, there's testing you can do for that stuff as well. But, you know, at the end of the day, this is what I'm talking about. It requires energy for most of these things to get in the cell, right?

You have to transport things across cell membranes. And when you're looking at syndromes, I mean, part of one of the things we're recognizing in autism these days is when you look at the genetics of autism, right, it's supposed to be this big genetic thing, there's no autism gene.

But when you look at what's different about the kid from the parents, they call it trio sequencing, where they sequence both parents and the kid, what you find is frequently a kid has a new mutation in a gene that controls some channel.

You know, we call them cation channels because it's a positively charged nutrient that's going in and out of the cell. So those cation channels, some of them are passive, meaning it doesn't require energy, but a lot of it does.

I mean, I don't know if you remember your sodium potassium pump. That's a basic cation channel that requires ATP to function properly. So a lot of these things require active transport.

They require ATP. So if your mitochondria are off in their cell danger response and not making ETP, that's not getting in either, right? And we see it over and over again with kids on the spectrum where their folate, their B12 level in the blood is high.

But when you look at it in spinal fluid, there is none. You're not transporting the nutrients, in this case, across the blood vein barrier. That's just one barrier.

Every cell has a barrier called a cell membrane. And so you have to transport things across that cell membrane. The definition of cell death is when there's no charge across the cell membrane.

So the cell membrane has to maintain polarity within the cell, and that requires energy. Most of the time these things just are not getting in because the cell is sick and that's part of the illness.

The mitochondria don't want the cell to be functioning. They don't want the cell to be dividing. They don't want to make new DNA because they're under threat.

And that's not the time that you want to go through the process of cell division. They want to chill and shelter in place and all that stuff until the danger passes.

Then they can go back to doing what the cell is supposed to do. And again, that's part of that whole cell danger response. Right. So I think this conversation really hits home that we cannot focus on killing these organisms.

We need to focus on healing the body, doing the detective work that we need to do to figure out what the pieces of the puzzle are for each individual person sitting in front of us and put together these unique treatment plans that are focused on healing the terrain So the body can go back to functioning properly so that it can control the level of these organisms in the body, whether they're bacteria, viruses, parasites, etc.

Right. And I think just to add on to that, because I know a lot of people use antibiotics, right? So just to add on to that, when you're using antibiotics to treat an infection and you have a Herx reaction, right?

A Herx reaction lasts two or three weeks. So if you're Herxing six months later, maybe it's not a Herx reaction. Yeah. All right. So to quickly recap all of this information, I think I just did the first.

Can't focus on killing the infection. We need to focus on the body. What is the body made of? It's made of cells. What's one of the most important things in the cell?

The mitochondria, right? So number one, we need to detox. We need to detox everything from our food and our cleaning products and our self-care products and our media and our know, electromagnetic radiation and, you know, all of those things.

And then we need to really make sure that our body is getting what it needs to function properly.

Healing the Terrain and Red Light Therapy

And a lot of this goes back to just simple dietary cofactors, vitamins, minerals, antioxidants, essential fatty acids, essential amino acids, really giving the body back what it needs to function properly.

And there are tests like the organic acid test, which I think is probably one of the biggest, broadest nets that not only looks at, you know, Krebs cycle intermediates and some nutrients, but also if toxins possibly are present or, you know, Clostridia yeast, things like that.

But then we can also use a test like the mito swab to actually evaluate the mitochondria. And there are some adjunctive therapies like HBOT. We didn't talk about, you know, near infrared and things like that, but those can be helpful.

And, you know, and then there's agents like Methylene Blue and other methyl donors, you know, that can help. But really, you know, what you're listening to is that there's a need for individualized medicine, and we have to kind of cover all of the bases.

There's not just one isolated thing that we've talked about today. That's going to be the cure-all for anybody. Right. And thank you for mentioning red light.

I can't believe I forgot to mention that. I know it's one of your favorites. Yeah, no, red light directly affects cytochrome C. So that that's how you shuttle electrons in the electron transfer chain.

So it's not just, you know, some hoodoo voodoo stuff. This is really cells generate light, bacteria generate light. and a lot of our, you know, they're called chromophores because they respond to frequencies of light.

And for their cytochrome C, it's specifically that red 660 that you get with a lot of those devices. And then, you know, I love telling our listeners things that they can do for free, but also like what's the biggest light in our world, right?

Go out in the sun without sunglasses on, without sunblock on. Did I mention I live in Michigan? There's no sun out there. Hey, you're coming to Florida soon.

Absolutely. We are not designed to be buying red light therapy products. We are not designed to be buying methylene blue. We are designed to live in the environment that we're supposed to live in.

And unfortunately, I mean, I spend all day inside, so, you know, not getting the sunlight. And the opposite's also true, getting blue light off of all the devices that we have.

You know, blue light tends to shut all the stuff down. It's the opposite of the red light. And that really, it's important we live as close to what we were designed to live as possible.

Now, sorry, I'm not going back to farming and raising animals or hunting for that matter. So, you know, I understand there are benefits to the modern life, but, you know, we do have to recognize what the costs of those things are and try and compensate for it.

Yeah, it's all about balance. Well, thank you so much for being here with me and with us. I look forward to listening to your lecture at the Line Bytes Symposium in November on the 14th or 15th.

Haven't decided yet. And, you know, for anyone listening who wants to either join us from anywhere virtually, you have that option or you can come down to Fort Lauderdale and join us in November and listen to Dr.

New's amazing lecture on all of this and in much more depth. How do you describe the energy or atmosphere of Lime Bites? Why do you keep coming back year after year?

Lime Bites has that energy to it. It's the community of people that show up. What I like is the diversity of the practitioners because it's all across the board.

Lime Bites Community and Closing Remarks

When you go to ILADS, it can be very, I don't know, stuffy. You get all the PhDs, all the people talking with words that you don't understand. It's like, I know that's English, but I don't understand what he's saying.

Right. Whereas, you know, line bites, it's much more down to earth, much more concrete things that we can use. And you're going to have this very broad perspective of ideas.

So I come back because I'm always going to learn something, you know, been at this game for a long, long time. And I'm always looking for, you know, what's that one tool?

What's that one thing I can take home? and use on my patients Monday morning. That's what I'm always looking for in a conference. And the great thing about line bites is you're always, always going to get that.

No matter where you're at in your journey, if you're just starting out, it can be mind blowing. If you've been doing it for a while, you're going to pick up tools.

If you've been doing it forever, you're still going to learn something. And I love the people. It's just, I mean, you know what it's like to get together like-minded people that sort of think the way you think, but have information that you might not have.

So that's what I love about it. Well, thank you. Thanks for sharing that with us. And I got to say, like every single speaker that I have up there that I hand pick, I'm just in awe of how much I learn at that conference from every single speaker year after year.

So thank you. That's it. Thanks so much for being here. Well, thank you for inviting me. I appreciate it. Absolutely. Thanks for listening to Lime Bites.

We hope this brought you one step closer to true healing. If it helps you, share it with someone who needs to hear this too. Together, we heal stronger.

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