Introduction to Mitochondria and Mental Health

If I were to say that mitochondria are central to mental health, I wouldn't be that far from the truth because when your brain's cellular energy, bioenergy goes down, its capacity to manage the functions that it needs to function but to do goes now.

And one of the direct consequences of that is mental. And perhaps one will not be that far from the truth if you say that things like PTSD, depression, anxiety is a manifestation of a depleted bio-energetic levels of the brain due to stress requiring that excess energy.

Welcome to Take Back My Brain with Lori Hammer, where real healing starts in the brain. I'm Lori, a functional nutritionist and mom who's walked the path from anxiety and burnout to clarity and calm.

Each week, we're going to dive into brain-based tools like amino acid therapy, gut health, fasting and faith to help you reclaim your energy, emotions and sense of self.

Alright, welcome to the podcast! I am very excited today. I have Sandeep Dugar with us today and he is the co-founder of Blue Oaks NX. It is an amazing mitochondrial supplement and has over 38 years of experience in small molecule drug discovery.

and development in oncology, inflammation, central nervous system, cardiovascular and metabolic disorders, and he's an inventor of several bestselling drugs.

This man has a long, long introduction and I'll have all that in the show notes for you, but I am very honored and excited to have this conversation. So Sundeep, thank you for joining us today.

Absolutely, Laurie. Thanks so much for making this happen. And I'll be happy to be here and excited to have this conversation with you. I love it. Because the mitochondria, I mean, there's a lot of buzz about it, and I feel like it's died down over the last couple of years, but it is so, so important.

So I would love to start out and just kind of explain to the audience, what is the Mitochondria and why is it so OK, well, I mean, that question alone is like answer.

You talk for hours. I know. Exactly. Well, how do I say it succinctly and clearly that it's the reason life sustains itself. Without it, there is no life.

But nothing more fundamental than that, as they say.

Meet the Guest and Podcast Overview

You know, when a lot of people say there was a difference between a functioning body and a dead body, it's the one, the functioning has mitochondria. Right.

So it really, in all seriousness, provides the basis of who we are, not only humans, but mitochondrion is one thing we share with every living thing on planet earth.

Plants have it. animals have it, fish have, so if you would think about it that the one common biological system that is present in every living thing is mitochondria suggests to you that it's a very important component of our life and health itself.

Yeah, we've kind of minimized it a lot and say, well, it just produces ATP and gives us energy. Which is the short

version of everything, but it's so much more.

100%. I mean, it's the one that, if you think about it, It's, the, one, that really guides your cells to make the protein they need to address any internal, external signals, impulses, stresses.

The mitochondria are the sentinels of life and death, health and disease. So yeah, I, mean ATP is a currency of energy that they produce, but they, produce it on demand.

not, they just don't, ATP is not stored. It's made on demand, but each cell of every part of your body responding to that cell's need of energy at that moment.

So is it safe to say as we're aging that are, that we have fewer mitochondria? Like if you have worse, worse age, what I want to stay worse decline that you had worse mitochondrion.

Yeah, so the two things is that the depletion or dysfunction or both of the mitochondria is central to our physiological function, to out brain, everything.

And you have your peak mitochondrial level is when you're about age 20, 21. From then on, it's all declining. And you know, one thing is that in physiological thinking, biological thinking we are so focused on the genome and the proteome and metabolome, which are very important relevant components, but we completely ignore the energy part of our cell.

And that's what the mitochondria manage and without it, the other things won't function. Right. What are the biggest things that affect our mitochondrial function?

Is it diet, exercise, sunshine? Like, what are, the, biggest foundation things? So two things, that is fundamental to optimal mitochondria levels and function is exercise and nutrition.

Okay, and this is the universality of these two things is that we say exercise and nutrition, incontrovertible, that it's good for health. Nobody will debate that.

And then if you really ask the question, why is it? It's because those two thing promote the level and the function of the mitochondria.

What Mitochondria Do and Why They Matter

One of the primary things that happens that when you exercise is your body's ability or cells ability to, you know, it elevates the level of mitochondrial function in your cells.

That's one of first things happens as an outcome of exercise. Right. Well, as you know, I work with the brain a lot, so I use amino acid therapy and diet and all those things.

So we're always trying to take back our brains. How does the mitochondria or what role does a mitochondrial play in different mental health challenges, whether it's anxiety, depression, or even like schizophrenia?

Can you address that? Yeah, absolutely. Your brain is say 2% of your body weight. But it uses 20% of its energy. It's amazing. Yeah. Okay. So there in itself lies a fundamental reason why mitochondria are relevant to brain health, mental health.

We talk about brain help in terms of neurotransmitters and receptors and all. but all of them are associated or their levels and function associated to the mitochondrial function in your neurons, in you glia, and your astrocytes, right?

So if I were to say that mitochondria are central to mental health, I wouldn't be that far from the truth. Because when your brain's cellular energy, bioenergy goes down, its capacity to manage the functions that it needs to function, to do, goes out.

And one of the direct consequences of that is mental health. So, and perhaps one can be not, one will not be that far from the truth. If you say that things like PTSD, depression, anxiety is a manifestation of it depleted by energetic levels of the brain due to stress requiring that excess energy.

Right. So for example, if you have a stress or whatever. The brain needs more energy to be able to address that. Now, if that stress is continuous, the demand is continues.

And if the demand is continuous, the depletion eventually continues and it spirals into the presentation of the disease you see or the pathology you'll see in some of our studies and others have very clearly shown that supplementation improvement of mitochondrial function and level helps address these issues.

Right. Well, would you then say that Or could you say that every disease that we know of has a mitochondrial dysfunction to it? Yes. Yeah. Is there any way around?

No, because that's their function. The mitochondria's function is to address healing. So if you think about it, we have a natural biological pathway to heal.

Internal healing is inherent in our biological processes, evolutionary biology. You get an infection, you heal yourself, your break a bone, You heal the self, cut your skin, heal your self.

Right? So the body has an inherent capacity to feel itself. And that is all embedded in the mitochondria. Because it is the first sensor of these external or internal stresses or insult and rushes to address it.

Now, if this insult or stress becomes sub-chronic or chronic, what you start to do is you to lose your capacity to heal.

Exercise, Nutrition, and Mitochondrial Function

Okay. And when you lose you capacity heal, then over time that manifests itself in the disease you see. Now remember, as I mentioned, one thing is that one of the normal ways that we know of to replace or improve mitochondrial function is exercise.

So when you have a chronic disease, your ability to exercise is not there. Not only are you using significant cellular energy to address those diseases, You are not replenishing or increasing the mitochondrial function and level of those cells because your ability to exercise or your desire to exercises goes down.

Right? True. So, for example, if you're depressed, well, you want to go and do exercise. But exercise also is not just what we think about exercise. Exercise is just going to the gym.

Exercises, many other things. Sleeping is an exercise of the brain. That's true. Meditation is in exercise, your, how you put in your environment positioning.

So. We, in our mind, when we think of exercise, we're thinking about a gym or running or lifting weights, but your body has, uh, there are other elements, ways to exercise to make, you know, your bio-energy levels go up.

Yeah. And so, for example, as I mentioned to you, the brain uses so much of your energy and most, and the highest demand on your energies when you're sleeping.

on your brain. So if you don't sleep well, you're not exercising the brain, right? It's interesting, isn't it? Interesting that we talk about sleeping and exercise in the same word, but it's true.

When you are sleeping, your physically not moving, But your Brain has the highest demand when you in your REM sleep. Right. And that's it for a lot of mitochondrial function.

It's function and it's the time when your brain exercise, right? And, and, so that why sleeping is so important. Right?

Because we say, well, if you don't, If you have a good night's rest, it really good for you in the morning.

Absolutely. Because it not just the physical resting, It is the brain having the ability to exercise itself. Definitely. So you would say detox is an exercise then too, because we're detoxing as we are, our body's trying to get rid of toxins.

Exactly. And it's repairing all the neuronal connections it has made during the day, it is cleaning out the debris, et cetera.

Mitochondria, Brain Energy, and Mental Health

It's really investing time to do house cleaning. You're right. The detox, but it also really relating to putting down short-term memories, et cetera. So the clutter goes away.

And if you don't sleep and you're not rested, that continues to build itself in your brain. When you have anxiety or you'll have other depression, one of the things that it also affects is your sleep pattern.

You don' t go through those cycles, the five cycles of sleep, a few times a night. So, yeah, you can't heal if you don't sleep. That's what I always tell my clients.

And so many people don' understand that you should fall asleep and sleep all night long. Like, like you shouldn't wake up. So I have so women who are perimenopausal, menopause, and they're like, Oh, I sleep fine.

I'm like so you never wakeup at night? And they were like well, maybe once or twice to pee, but I go back to sleep right away. But that's still not a good night's sleep and that still telling us there's definitely some mitochondrial dysfunction happening there.

Your body's not able to repair the way it needs to. Yeah, correct. You have an amazing product. Can you tell us about the Blue Oak NX product and what it does to the body or for the Sure.

So this is something that, you know, I've been working on for the last 16 years or so. And the genesis of this was some clinical studies going on, on epicatechin itself.

Sorry about that. But the issue in my mind came in is that what the clinical observation was showing was exactly mitochondrial biogenesis improved mitochondria function.

And as I said, part of the thing is that aspects of mitochondrial outcome is related to exercise. So here you're seeing a phenomena that would associate with exercise, so the question came in to my mind, well, let's step back and ask the What happens when you exercise?

What is the mechanism through which your body makes more mitochondria when your exercise. The fact that it does is established, but how does it do it?

And so what I was able to figure out working with colleagues and other group, you know, people in my group that When you exercise the body actually makes a new steroid.

The mitochondria make a steroi. when there is a signal. So when you exercise, you make peroxide, which creates a single to the mitochondria to make this specific steroid.

And we're the first ones to identify it and to detect it in humans and detect in rats and detected in worms. It's conserved across species. They all do it.

And this, we're the first ones to report this in scientific literature, it's pharmacology. And what this does, is it is the signal to the cells that there's an energy deficit or demand, hence they need to make more mitochondria.

What Epicatechin does is mimics this steroid. So if you are not able to exercise, You cannot, you don't make the steroid to induce mitochondrial biogenesis or improve mitochondria function.

Hence the supplement that we put together is structurally related to the steroids. So if you take this, it makes, gives your body the signal that you have exercised, even though you haven't.

Wow. I didn't realize it did that. Okay. That makes sense.

Sleep, Detox, and Brain Recovery

So now what your body, so if you're not well and for whatever reason, of course, exercise, physical exercise or even your sleep patterns are disturbed, correct?

And so what this supplement does is signals to the body. Hey, we have the body's just exercise and it starts to bring back the mitochondrial function through that signaling process I just told you happens naturally.

So as far as I know, we're the first and only supplement that actually improves mitochondria level within the cell, okay? A lot of the other supplements go improve the function of the present mitochondria already present.

Right. Okay. But what if you don't have enough to begin with? It's not creating the current, these other supplements don' create new mitochondrion. They help the mitochondrial function better.

What we do, what we are two things. Number one, promote the formation of new mitochondria, but also protect the present mitochondrion from damage. Okay.

So that when you take other things, yeah. Yeah. Sorry. Go ahead. Other things. it enhances the function, because now you have the mitochondria, right?

So if you think about the other food or supplements you'd think as nutrition, okay? Because all that you eat, whether food, supplements, all, is targeted towards the Mitochondria.

Because at the end, it's really the simplest thing, whatever you needs to go to make more ATP. Yeah. And of course, it also has building blocks like amino acids, et cetera, for your proteins and all.

But the primary thing is that it needs go and make ATP, right? And so what we do is actually provide for Increase levels of mitochondria and maintain healthy levels for mitochondrion That's amazing so that's gonna make a profound effect on all mental health conditions, you know Yeah, yeah both physical and mental because The increase in mitochondrial level and function is key and critical to health Hey friend, just a quick break to remind you if calming your brain is the missing piece in your practice or in you home, my Mind Thrive certification course teaches you exactly how to do that with targeted amino acid therapy.

So it's real science, real results, no band-aids. Enrollment is now open. Link is in the show notes. Yeah. And you've done so much work in the autism community.

I would love for you to kind of jump off of what you were just saying about making new mitochondria and how that affects, you know, children who have autism.

Right. So again, autism, if you think about it, is a kind misdirected mental state. So in some instances they are hyperactive, right? And are hypereactive.

And so what happens is that the machinery in these kids is dysfunctional to put excessive demands on behavior or other things depending on the external stimuli.

But once that happens, it starts to deplete the bioenergetics from other components or the functioning of the brain. So you have a particular processes that are hyper-activated in a way.

Blue Oaks NX and Mito Catalyst Explained

Now it may present itself as physical hyperactivity, or it might not. But nonetheless, the brain is imbalanced as its function, so it cannot maintain normal function in other areas where it needs to because of the deficit of their bio-energetic.

If you implement and supplement that and you provide the support, then these other deficits are addressed and we start to see more of a normalization of activity.

Now, autism doesn't always have to be dysfunctional. You have very high functioning autistic kids, right? And to them, for example, they have high acute capabilities of whatever, whether they are music savants or numbers or whatever have you, which is a good thing.

But that hyper, again, it's a hyper activity and we accept that as a good thing because we see it as an unusual but maybe a more functional outcome of these kids.

But, that still depletes them from other areas so that they may lack in emotional components, right? So, bio-energetic component is now kind of lopsided on one side.

So, so the cost of that is the absence of something else. And that absence could be anything, right? Translate to anything. So to me, that's the whole idea that yes, they have a really significant function in certain ways or certain areas of the brain, but that results in deficits in other areas because the total brain health or by energetic quanta or the currency available is still limited.

That makes sense. So when you have that currency that is limited, you're coming in with your amazing, is it called Mito catalyst? Is that how I say it?

Right. Yeah. Right, which is amazing. You come in. And then what, what changes are you seeing? So I think, from what we are looking at is, clearly improvement in behaviors, what we call, you know, through our assessments.

Now, so each kid responds to their own genotype and phenotype, right? So there's no standardized approach and each one, each child responds according to what is their pathophysiological state.

Okay. So, which is expected because as I said, you know, when we have a capacity to heal ourselves, what is addressed first or what behavior or phenotype is address first is controlled by your body.

We don't control it. All we're doing is giving the body the support to do what it needs to. right, to make their function well. And then the body takes over from there and does it.

It's the same thing, Laurie, like when you exercise, right? Each one of us will have a differential response to the exercise we do, and that is dependent not only on our internal physical health, but the external environment we live in, the other, you know, the totality of the situation we find ourselves in.

And that's all we do is give it the support and the body does the rest. That's my philosophy too, remove the interference, support the And evolutionary biology tells us it is perfectly designed to keep itself healthy.

Autism, Bioenergetics, and Individual Response

It just is losing the capacity or the internal cellular energy to do it. And just like exercise would do, this product does it without you having to exercise.

That doesn't mean you shouldn't exercise people. No, no, you're right. 100%. Please, please. That is not what I… This is a replacement for exercise.

Because your need for exercises is far greater than how much exercise you do. So you're always in a deficit. And

when there is situation where the demand on your energy is increased because of internal or external stress or insult, your need to exercise increases proportionately, but we don't do it.

Okay. So, yeah. This is not an exercise replacement. It's still a supplement. Yes. Very good. Is this supplement, is the mitocatalyst for anybody or do you need Is it really only really beneficial for somebody who has a dysfunction going on?

Well, I think probably most everybody has the dysfunction. We all, we all have deficit. Okay. Because as we age, the level of mitochondria goes down. And the basic idea is that by the time you hit age 20, 21, you stop growing physically.

So that physical growth from your birth to age 20, 21 is this internal exercise that the body is going through. And in that case, it's continuously producing more mitochondria.

Now, when you stop growing, the cell doesn't need that much mitochondria to be made. Cell only makes things that is needed or necessary. When that need goes away, you start losing mitochondrion.

But then you lose mitochondrial through a variety of reasons, not necessarily a disease state, but we put our bodies through regular insult. through the food we eat, the environment we have created for ourselves, pollutions, sleeping habits, whatever have you, accelerates this mitochondrial loss.

So the process of aging itself is a process for mitochondria loss So you don't have to have autism. You don' have other mental stresses or physical disabilities or dystrophies, muscle dystopia.

The process of aging causes a deficit of mitochondria. So to your question, I think it's something that most everybody can take to replenish the mitochondrial levels that they have.

Is there any particular lab tests out there that really assesses your mitochondrial level? Well, yeah, but they're all indirect measurements, right? So you can look at indirect measurement.

And we're also considering seriously, you know, working to figure out what is the best way to look a mitochondria improvement of mitochondrion function.

There are swap tests, et cetera, out that look at mitochondrial protein or indirect measurements that would suggest that mitochondria levels are improving.

But as I said to you, you know, There's not been a true intervention to improve mitochondrial level and function. And so it has been hard to find a validated marker because to determine a validate marker, you need to have a tool that does what you want it to do, that such as includes mitochondria level.

So we are working on it. We're actively interested in figuring out what are the two direct measures of mitochondrial function. One of the things that we're thinking about, remember the steroid I mentioned, is to really understand how its level correlates to mitochondrial function.

Measuring Mitochondrial Health and Daily Variability

But mitochondria function is not just a standard, right? It is related to your body. So a mitochondrial function level for me could be different than someone who's age matched to me.

Because the body only provides a kind of mitochondria level function that is appropriate to that person. So how do you standardize it? So one of the best ways I say to people is how do you measure the effect of exercise?

Right? Is to look at a phenotypic response. Right. How do feel? How'd you sleep? Your energy to walk, sit, whatever. You know, those are all subjective.

Yes. But individualized to each person, it's a pretty objective measurement. Right? And I think there are certain things where you need to do it too as an individual here and here, each individual, because, you know, even if I were to measure the secondary biomarkers, there's no way to say, well, this is the level you should be at.

And also remember that level may change from day to day, right? Yes. Because mitochondria are very dynamic. Depending on what you're doing, when you measure it, these levels will change instantly.

For example, I just move my hand. The muscles in that hand immediately were producing ATP. Sure. Okay. Because otherwise I can't move it. Right? So I need the energy.

ATP is not generally stored. If it's not stored, it has to be produced where it is. So when do you measure these markers? How do measure this? It's hard to pin down because we are constantly dynamically different at every given time.

Right. What is the standard time to measure? So this is how I look at it, Laurie. So I'm not saying that it cannot be done, but what I am trying to say is that having a standardized general measure of mitochondrial function is hard because it's so dynamic.

its function is so dynamic. I mean, when you read a lot, you're changing your mitochondrial function, right? When you sleep well, your doing it. One day you'll sleep, the next day, well your system changes.

It's adapting. Exactly. So yeah, it's a difficult one to Yeah. Well, and we always, we, always want something concrete. We want an answer. Am I improving?

And so I think, you know, lab testing has its place, but even a lot of the standardized lab test. I, I always wonder, is it really standardized because our body looks different in the morning than it does in.

It looks on day five of my cycle, as opposed to day 25, like there's variations. And it depends on what you ate for food and dinner last night, right?

Yeah, did you have wine or did drink water? There you go. Whether you had pasta or you chicken, whether you add vegetables or not. So you're absolutely right.

All these things play a role in how your mitochondria are functioning moment to moment. And if that level is changing, adapting dynamically to your environment, There is no absolute standard or a timeframe when you can say, I'm going to do a blood draw or, you know, thing.

No, with a biopsy, can do it. Okay. You're not, but you're now going do muscle biopsies constantly to see how you might. That's not your standard lab procedure.

So I say to everybody, Look at, be observant of your own function, how your body's functioning, right? You were climbing upstairs, are you able to do it better?

I mean, when you do the same quanta of work, is your heart rate, you know, steadier or is reduced with weight. So if your cardiac function is improving, you're not out of breath as much.

That's great. We each look at each of ourselves as enough one to look how we are physically and mentally doing compared to say 30 days or 60 days. And just like exercise, this is not an instantaneous response like you were to take Tylenol for a headache.

Right. This is a systemic rebalancing you're doing. And when you doing this, that systemic rebalancing is also contending with the changes that your body is saying during the timeframe that you are observing.

Lifestyle, Safety, and Final Takeaways

So if you were to do a 30 day observation, not all of your 30 days are identical. And the next 30 days are not the same as the previous 30. So you may have little blips along the way, but as long as that trajectory is going up, you will see it.

And sometimes people say, well, I haven't seen anything. Well, that's fair, But there may be other things you have done in that period that has actually caused a deficit in the mitochondria, more so than normally would have happened.

So many factors that play into every piece of our health. Every piece. Yeah. Get out of her heads of it and just, just do it. Do the, do the right things to eat right, take your right supplements, sleep right exercise.

And in the sun. Well, Laurie, what is interesting is that we all know exercise and nutrition are the two keys to health and staying healthy. and yet those are two things we don't do well at all.

I know, which keeps me busy. So no wonder, no, wonder we're not well. Okay. I mean, the food we eat, you know. Every day, instead of eating an apple, we drink an Apple.

instead of eating good things, we eat ultra-processed food, you know, and we don't diligently go exercise or even, I'm not saying go physically, but you exercise could be meditation, exercise can be good sleep, those are the things we do not do.

So no wonder. And then when we dont do those things. We hit this problem and now we want to take pills or something. so that we compensate for not doing it.

Right, so we can keep doing the wrong things. And then it's like, okay, fine. Yeah, humans are. Human beings are so silly. So silly, if an animal's tired, an animals lays down and goes to bed.

Like they take a nap. When my cat is tired I cannot take to nap and it doesn't really care what else needs to be done. Exactly, and if you look at your cat, it is a perfect example a body living in its rhythm.

Okay. There you go. Yeah. When they need to go sleep, they go to sleep. They don't turn on the TV and watch TV at midnight, right? That's what we do. Well, he's scrolling on our phones and doing all that silly stuff.

Shut the light off and go for bed. Then you'll have telepathy. Is there anything you want to leave the audience with? No, I mean, only to the extent that, you know, how we approach the development of myocatalyst has been through a very significant and diligent R&D process.

Okay. I've been at it for 16 years and now comfortable enough to say that it is safe. Okay, often it does not come with caveats that this and that is a very safe product.

We haven't seen any issues with it over the years of many, many clinical studies. And hopefully this can help people at least address. the issues of the pathologies.

But I would always say to people that yes, this will help with dress, but then you have more to do. Don't just rely that this is, you know, the panacea.

Continuing exercise on top, continuing nutrition and other ways to live a healthier is critical because this not just a straight magic bullet. It is something that will help you.

I hope it helps you if you take it. All our studies indicate that it should. But again, this is a part of an overall solution, not the solution. So I want to leave your audience with the message that please do all the other things you need to do to keep yourself healthy.

Yes, I love that. Well, thank you so much. This has been enlightening. The mitochondria is amazing and foundational and your product is Amazing and Foundational and I'm all about doing the foundational things.

So thank You for sharing your wisdom and Your time with us today. Absolutely. And thank you for the conversation. I really liked it because instead of thing, this was a free flowing conversation without, you know, any, You know orchestrated thoughts or really like these kinds of conversations where it's just.

A free-flowing conversation and hopefully your audience will find this of value and, and then hopefully lead to good health to everybody. I know they're going to find it great value.

I've got a great audience. They're very loyal. And so in this show notes, I'll have the link so you can go find the mitocatalyst and read all about it and order it.

Then I love each and every one of you. So thank you so much for listening. And if at all possible, leave me a review. That would be amazing too. So thank you so much.

God bless. I'll see you in the next episode. And if you're ready to start your own healing journey, explore our courses and our coaching programs at lorihammer.com backslash store.

So until next time, remember you cannot medicate away a nutrient deficiency and healing your brain isn't just possible, it's powerful.