The Benefits Of Nitric Oxide In Reducing Brain Inflammation And Improving Vascular Function Transcript

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Introduction and Speaker Background

– Hey everybody, I'm Dr. Diane Mueller, your host of the Microbes and Mental Health Summit. I am so thrilled to bring on our next speaker, Dr. Nathan Bryan, Dr. Bryan welcome to the Summit.

– Thank you very much. It's a great honor and pleasure to be with you. – Well thank you so much. Let's get started with just telling everybody a little bit about yourself about how you got into this really unique and very niche research.

– Yeah, well I'm a native Texan. I grew up in Texas, I got a bachelor's degree from the University of Texas at Austin and biochemistry from there I enrolled at L. S. U. School of Medicine where I finished a PhD in molecular and cellular physiology uh then moved to Boston, trained as a postdoc for 2.5 years and then came back to Texas and I got my first faculty position at the University of Texas Health Science Center in Houston in the Institute of Molecular Medicine. It was there where we started a drug discovery program around nitric oxide. So it was really during my time at L.

S. U. Where I was introduced to the science of nitric oxide and you know, Nobel prize has just been awarded for its discovery. So we knew was extremely important subject matter but there were still so many unanswered questions, you know, simple, basic questions like how does the human body produce nitric oxide, what goes wrong and people that can't make it, how do they present clinically and then perhaps the most important question once we understood all that biochemistry is how do we restore and recapitulate nitric oxide signals.

And so that's really taken up the past 25 years of my personal and professional life. And so here we are today, – Wow! years. Well, let's start with the basics for everybody, just to make sure everybody's on the same page. So what exactly is nitric oxide?

And what does it do? Why is it so important in the human body? – Yeah, well, it's a gas, it's a gas that's produced in the lining of the blood vessel that was having was first discovered. And once it's produced, it's gone in less than one second.

So it's produced. It activates a number of these second messenger systems. But it's a cell signaling molecule itself. All cells in the body communicate with one another.

So it regulates vessel tone, blood pressure, oxygen delivery circulation to every organ tissue and cell in the body. It's a neurotransmitter in the central nervous system.

So that's extremely important role in neurological health and mental health. And it's also how our immune system fights off invading pathogens and viruses and bacteria.

So if you can't make nitric oxide compromise in the middle to make micro oxide, there are a lot of things that happen. Number one, you get high blood pressure, you develop sexual dysfunction, You develop neurological disease vascular dementia.

Alzheimer's, it disrupts insulin signaling. You get in some resistant type two diabetes. So a number of kind of multi systemic symptoms develop simply around the loss of production of micro pockets.

– And then obviously when we see certain things that you're talking about, when we see things like oh we have, you know, rectal dysfunction or we have cardiovascular disease, the symptoms are so widespread. So just from a standpoint of widespread symptoms, I think we can get mental health issues regarding just like, gosh, I feel horrible

and that can lead, you know, indirectly to mental health issues.

Are there any mechanisms that you know of that are really related to nitric oxide and say directly producing things like anxiety, depression or other mental health issues?

What Nitric Oxide Does in the Body

– Yeah, well, from a very simplistic standpoint, every chronic disease, including mental neurological disease is controlled by blood flow and profusion.

And so the hallmarks of chronic disease are all there's four components, there's reduced blood flow to the affected organ, there's inflammation, oxidative stress and immune dysfunction.

And so it doesn't matter if it's neurological disease, mental disease, heart disease, kidney disease, autoimmune disease, those are the four fundamentals of every age related chronic disease. And so it all starts with a lack of profusion and circulation. So if you don't get adequate blood supply to certain regions of the brain, you know, a lot of these neurotransmitters or amino acids and uh you know, small molecules. And so if you're not getting sufficient blood flow to certain regions of the brain, those regions of the brain become dysfunctional.

So they're not getting what they need to do their job. And so you you develop these symptoms, whether it's anxiety, bipolar disease, depression, you know, A. D. H. D.

It can all go back to a lack of perfusion and we've been able to cooperate this through. You're looking at functional M. R. I. And cerebral blood flow.

You can do spec skins and work by Daniel Amen. And so the common denominator in all these is just reduced blood flow. So now it's accepted if we can restore blood flow to certain regions of the brain or in heart disease, we can restore blood flow through the coronary arteries then you can basically reverse and prevent the progression of that disease.

– Yeah, thank you for that. And sometimes in my clinic I find that people get so excited about almost like one tear down and root cause. Right? So it's like okay mental health, you know, depression. We're talking about serotonin, we're talking about, we're talking about a neuro transmitters.

But I love the way you're breaking this down for people because it's it's like we need to keep going steps down to really get to more of the fundamentals of what we're talking about.

So, you know, blood flow can prevent all of these things and so then let's take a step back and say, okay well if nitric oxide, it's related to proper profusion, proper blood flow, all these different things then how does the body tell us a little bit about how the body is actually creating nitric oxide and where it's actually coming from.

As far as a production standpoint. – Right, well we've recognized now that there's two primary ways the body makes micro cock side and the first half way to be discovered was through an enzyme called micro oxide symptoms.

That enzyme is found in the endothelial cells, cells that line all the blood vessels throughout the body. It's expressed in neurons. There's a neuronal nitric oxide synthesis and you know now we refer to them as lost 12 and three. There's three different platforms and we've really gotten away from Enos and Enos because these ice it forms have now been found to be expressed and other cell types. So its constituent li expressed ubiquitous enzyme. And so that enzyme converts argentine into nitric oxide. And so argentine is obviously a semi essential amino acid. And this is a really complex uh complicated biochemical reaction.

So the older we get, the less functional that enzyme becomes. And so we call this indefinable dysfunction. And so in the feeble dysfunction is really the precursor to every major chronic disease.

So we have to figure out and now we know how to do that. We understand the enzyme biology and biochemistry that we can actually re couple and maintain functionality of that Boston's I'm the older we get.

So that's the first pathway. The second, which is relevant to this is through the action of the oral microbiome. So the foods we eat, primarily come the nitrate that we're talking about.

This metabolized by the bacteria is found primarily in green leafy vegetables, things like spinach, arugula, kale. Um you know the dark green leafy vegetables, beetroot for example.

And so when we consume these vegetables it's taken up in the proximal gut. This this anti on nitrate and then it's concentrated in our celebrate length.

So 90 minutes after we consume a plant based diet or any vegetable for that matter, that nitrate is concentrated in our celebrated brains now for the next 68, 10 hours each time we salivate provided we have the right oral microbiome.

The bacteria resp I Raun nitrate and then metabolize it into nitrite and nitric oxide. And then now when we swallow their own saliva we're getting a burst of micro oxide gas and aluminum stomach. That micro oxide is vezo active.

It can improve gas treatment, coastal blood flow.

How Nitric Oxide Is Produced

It produces these second messengers it binds to glutathione. It's taken up in the circulation and then this becomes so active. So you can actually dilate the blood vessels and that's why things like a plant based diet, certain food patterns, certain dietary patterns epidemiologically have been shown to lower blood pressure, improve longevity and reduce the onset and progression of a number of chronic diseases. All this can be traced back to the production of micro toxin. – Yes, that's super interesting.

I'm curious about is you're talking about nitric oxide synthesis and we're seeing the potential decrease right of that enzyme with aging. Is there a subsequent, you know, need then you see as we age to increase things like our green leafy vegetables and the things that we can actually produce this nitrate to make up for the decline of this other pathway that's occurring with aging.

Do you see that? – Yeah. You know, we we published that, I believe it was in 2006 or 2007 that you can completely overcome in the female dysfunction by a diet. So the good thing is these two pathways, they both produce about 50% of the total body micro toxin.

But if one becomes dysfunctional then we have to compensate on the other. And I think that's why kids can get away with not eating a very healthy diet because they have such good in the female function that the body is not requiring them.

You know, that's coming from your diet. However, the older we get And the less nitric oxide we produced through the nose enzyme, then we're almost 100% reliant upon diet and the foods we eat. But the bad things start to happen when we haven't ethereal dysfunction and a poor diet where we don't get enough nitrate from the diet if we're using mouthwash and acids and that completely shuts down total body nitric oxide production. And that provides a very slippery slope for patients with the rapid onset and progression of most age related chronic diseases – Do you? Are there certain tests that people can do for the nitric oxide synthesis enzyme to see if the activity is working?

And what would those tests be? – Well, there's a couple. So you can do genetic testing. So you can look at single nucleotide polymorphisms in the gene that will give you kind of a picture at the genetic level. But also you can look at the function of the environment. To me that's the most important because, you know, genetic expression doesn't necessarily always translate into functional activity. So the best way to measure endothelial function or the function of the nose enzyme is through what we call flow mediated validation.

Right. So it's it's called venus Seclusion, pet photography. Now, there's some non ischemic photography methods that you can look at kind of a pulse wave, and look at the structure and function of blood vessels and all of that is dependent upon nitric oxide production. So, these are FDA cleared medical devices, you know, they're very valuable tools. So, what I find is very few physicians or practitioners utilize these devices and really get a functional readout of a person's nitric oxide production. – Yeah, that's definitely really helpful.

I know that'll come up for our listeners and, you know, even from a standpoint of genetics and we're talking about our single nucleotide polymorphisms. What sort of like co factors that people need to watch out for from the you know, the proper function of the nagas enzyme.

– Well the rate limiting step in nitric oxide production from that enzyme is the availability of tetra hydro box or B. H. Four. And interestingly a lot of people don't realize the connection. But the metal tetra hydrophobic reductase enzyme feeds into that mosques catholic. So if you have a patient with an M th fr smith then by definition they become nitric oxide deficient because it's not just a methylation disorder but that enzyme reduces by ah through the tetra hydro box which then shuttles it through the nitro oxide synthesis pathway. So an Mth fr patient is by definition has in the fetal dysfunction and unable to make nitric oxide.

So in those patients we have to kind of supplement or replete the tetra hydro often or preserve its reduction potential and prevent its oxidation. Now we understand how to do that. And so we've been able to re couple the nose enzyme prevent CH four oxidation and then you allow the recovering of nose and restore restoration of imperial function.

– Okay, that's yeah that's super helpful and I think it's really important because then th fr like that's I feel like the most popular, well talked about you know thing, it's obviously way more complicated. But so many people I think really just look at that genetic, you know dysfunction or the polymorphism and say well this means that I can't detox and what you're showing here is just an example of how many different things and in this example like okay we can't you know, we have a visa and epithelial problem.

Now we have a nose problem. Now all created from the dysfunction of even the you know, the polymorphism at the you know, m th fr level. – Well I think it's an astute observation from those patients because it's true they can be toxic because if you don't have sufficient blood flow to get the good stuff in and take the bad stuff out, then you become toxic so that it's not just the methylation and detoxification from from removing or detoxifying the molecules the toxins but actually removing them from the body through your cardiovascular system.

– Yeah, it definitely is. And then to kind of take a step back to something else you said. So from the standpoint of the production of nitrate. And we're talking about the health of the oral microbiome.

We're talking about need for the proper diet. So it sounds like those are some of the main things that need to happen for that pathway to work. And then for this other pathway where we're talking about the production of nitric oxide synthesis. And we're talking about, okay we need to have proper and epithelial health. What are the what other types of things should people be watching out for that? Could cause say an endothelial dysfunction and lead to a lowering of that N. O. S.

– Well it's probably not surprising to you but probably surprising to your listeners is that it's usually always diet and lifestyle. So there you know there's certain inflammatory diets processed food you know. Life is a day that work from Stephanie Senate shows that that shuts down nitric oxide production.

Their environmental toxicants that do this. There's drugs that inhibit nitric oxide production, the most common one. Our proton pump inhibitors. These and assets things like parasol Zantac NexIUM, prescription and over the counter. So those cause an increase in a in a molecule called A. D. M. A. Or asymmetric by method little origin.

And those become direct NOs inhibitors. So they inhibit micro oxide production. And the other one that most people don't really pay attention to our cholesterol lowering medications. You know, statins, if you get your cholesterol below 200 you become to compromise the fluidity of the membrane and we've got to remember that there are extra cellular Liggins that signal the intracellular pathways.

And if that cholesterol backbone of the membrane becomes compromised then you lose that cell signal and nitric oxide synthesis enzyme is tethered to the membrane through that cholesterol. And if we lower our cholesterol below 200 we disrupt that signaling when you become nitric oxide deficient.

There's clear evidence now that you become in some resistant even some epidemiological data showing you know increased incidents of certain cancers. these are mitochondrial toxicants. So you know, our bodies never designed to chronically inhibit cholesterol or stomach acid production.

These are essential metabolic pathways. There's a reason the human body has these enzymes to make it because it's essential and necessary. So chronically inhibiting these biochemical pathways you do so at your own peril.

– Yeah, I think that's really really, really important information because so many times we're not looking at those types of downstream side effects. And when we're talking about you know since this is a conversation too on microbes like let's talk about you. I know you mentioned obviously the oral microbiome but what about the microbiome of the gut or the sinuses?

Like other parts of the microbiome of the body. Like how does how does the microbiome in other areas of the body play into nitric oxide? – Well, we've really become to appreciate the microbiome over the past 20 years and you know the bacteria in and on our body outnumber our human cells 10-1.

So this microbiome is extremely important and I think clinically that became obvious when you can cure a lot of systemic diseases by fecal transplants.

I mean to me that goes against everything we were taught in in academia.

Testing Endothelial Function and Cofactors

Right, So the fact that you can improve clinical symptoms through a transplantation of bacteria, fecal bacteria for that matter shows the importance to this.

So while while there was enormous efforts on kind of mapping the entire gastrointestinal microbiome and the makeup and the diversity that we focused on the oral cavity, the oral microbiome because there was very few people focusing on that.

And for me that's where everything starts, where digestion starts. It's where, you know, the first stages of digestion with saliva and you know, the secretion of hormones and what we find is that, you know, not surprisingly, the greater the diversity of the oral microbiome, the better nitric oxide production. Yes.

And so globally speaking, we know that the most of the bacteria that live in and on our body, our symbiotic bacteria, they're the good guys that are providing the host with the central metabolic products or byproducts that we as humans can't metabolize or can't get generated.

So when we disrupt this that deprives the human host of essential co factors like short chain fatty acids. But as it relates to nitric oxide, these bacteria that we've been interested in studying for the past 20 years or what we call nitrate reduces. So these are faculty of anaerobic bacteria that if oxygen's around, they can inspire on oxygen in an anaerobic environment, then they switched to nitrogen. They reduced nitrate to nitrite to nitric oxide.

So that's what we focused on. You know, we've we've characterized these in the oral cavity, there's certainly some nitrate bacteria reducing bacteria along the gi tract.

But as you know, the communities and the ecology of these microbiome changed depending upon how far down in the gut. So obviously the colonic bacteria is much different than the oral bacteria and that's for a reason because there's a different set of resources there there's a competition for resources.

The ecology is completely different. The oxygen environment is very different to the makeup of the microbiome. It's

different. So as long as we maintain a healthy microbiome and typically they take care of themselves, the good guys keep the bad guys at me.

But what's clear if you disrupt the microbiome and this has been obvious now through antibiotic use disrupting the gi microbiome and you get a lot of major problems.

What we've found is if you disrupt the oral microbiome, whether it's through fluoride toothpaste or antiseptic mouthwash, you kill the good guys, you disrupt micro cock side production, your blood pressure goes up, you lose the protective benefits of exercise, you develop erectile dysfunction and now you're on this very slippery slope of developing chronic systemic disease including neurological disease. – Yeah, I mean what I'm hearing in some ways it's it's there's an element of like a vicious cycle that happens here right where it's like we can have something to say disrupt the oral microbiome, then we lead to a decline in the production of nitric oxide that will further make a environment and terrain where we could have even furthering microbiome disruptions and we kind of get into the cycle correct and we're really when we're talking about, you know microbes and we're talking about about nitric oxide were also just to make sure I'm clear for the audience, we're talking about either we could be having like pathogens that are leading to the problem or we could have just a decline for a variety of reasons of the good guys of our normal flora and whether it's a decline in our normal flora or in the pathogens, either one of these situations are setting us up for nitric oxide deficiency.

Is that is that correct there? – No, you're exactly right. But I think what's clear to us through the research is that if you disrupt the healthy microbiome that really sets the stage for the pathogens to come in and take over and start driving the bus, right? But the good guys always keep the bad guys at bay. So it's a competition for resources and their biofilms.

Microbiome, Diet, and Nitric Oxide

So there are different layers of bacteria, different levels in these biofilms and they're there because you're producing different there's resources available at different stages of this.

So for instance, if you use mouthwash, you completely disrupt the diversity of the oral microbiome, You kill the bad guys, but you also kill the good guys.

So there's a lot of collateral damage and the consequences of that are you you produce less micro cock side through this Ontario salaried circuit, which leads to chronic beso constriction, getting less blood flow through your blood vessels, you get inflammation, oxidative stress and immune dysfunction And those are the earliest stages in chronic disease.

– Okay, yeah, that makes a lot of sense. And another thing that I feel like people are gonna be wondering about in just this whole conversation is a lot of there's a lot of talk of using arginine as a way of increasing nitric oxide in the body.

So in your research in your study, like how effective does that wind up being? Does that wind up being enough in many cases to restore nitric oxide levels?

Can you talk a little bit about argentine from a supplementation standpoint? – Yeah, it's a it's a very good question. You know, there's been a lot of misinformation out there for more than 20 years now.

So when the Nobel Prize was awarded 98 was realized that this enzyme converts arginine to nitric oxide. Then the market was flooded with Argentine based products.

But someone who doesn't understand the biochemistry and the Entomology may believe these marketing things. So we've been looking at this for more than 25 years and l arginine is a city essential amino acids. So you get it from the breakdown of proteins that you eat, whether it's playing or animal proteins, but it's also made to the urea cycle so that you recycle you get arginine as a byproduct the margin of success uh synthetics marginal lines.

So the amount of argentine you need to theoretically saturate, the enzyme, the binding site of the enzyme is only five microphone. And even in the sickest of sick patients they're circulating and intracellular levels of Argentina 102 100 microphone. So 20 to 40 times higher than what's necessary.

The theory of what we saturate the enzyme, we call this the Michaelis constant or the binding constant. So there's never a condition. Well, I shouldn't say never. There's one rare genetic disorder called arguments ascetic acid Maria, where these patients can't make Argentine recycle this one.

But everybody else in the world makes enough argentine where there's no need and there's no biochemical scientific basis for supplementing Arjun. And in fact there's at least two clinical trials showing that if you give high dose argentine to patients within the female dysfunction, they actually get worse.

This has been demonstrated in post infarct patients, argentine caused higher death than the placebo. And in patients with peripheral artery disease that were given argentine, they actually got worse, intermittent clarification went up uh onset of symptoms the time of symptoms increase. So are giving argentine is a very bad idea to a patient within the female dysfunction and doesn't have a functional nose enzyme because what happens is you start to prime that pathway.

And then the enzyme, there's a disruption in the flow of electrons. So you generate super oxide instead of nitric oxide to exacerbate the oxidative stress.

The other problem is you start to increase the expression of Argenis and Argenis is an enzyme that diverts our gene away from nitric oxide production and X.

Crease it through or Nathan and Yuria through the Europe. So there's never a clinical condition where I would recommend giving arginine to any patient, maybe a young, healthy patient, you get a little bit of extra nitrous oxide out.

But to me again, biochemically and start geometrically, your body makes enough to produce micro toxin. – Yeah, thank you for that. I feel like this is a perfect example of how many times it's so easy and medicine to be essentially taking a study and extrapolating information from it that just doesn't show, you know true clinically.

And it sounds like in this example it's like not only is originating supplementation, not doing what we wanted to do, it actually could cause some of what we're trying to avoid.

Right? – And the other, the other thing that really drives me nuts is you know, sertraline people goes, oh well I'll give sertraline. Well sexually you're another two steps back from part from nitric oxide production, sertraline is a byproduct of micro oxide production.

And in any biochemical reaction there's always feedback inhibition, right? So if you're getting over production of that feedback inhibits the pathway. And that's kind of the regulatory pathway.

So this whole concept of products that contain arginine and sertraline and a laundry list of other products. I'm not saying these products aren't good because they provide some good ingredients but they're not nitrous oxide products, they do not generate nitric oxide. And in fact the companies that market these products know nothing about nitric oxide biochemistry.

And it drives me absolutely insane because you know basically everybody can say the same thing in the supplement market, but there's very little products out there that actually do what they're designed to do. – Yeah, thank you for that.

So then when we're talking about, you know, the need for increasing nitric oxide for proper blood flow to in this example to help with mental health, What do people do? Like how can people, besides the things we've already talked about like help the oral microbiome, you know, make sure you eat a proper diet. We go into a little bit more of like actions.

People can can actually take. – Well that's probably the most common question I get is how do I increase nitric oxide production? And my my ankles? Despite the fact that it's a very complex science.

The solutions are really simple. So you only got to do two things. Stop doing the things that disrupt micro oxide production and then start doing the things that are clinically proven to promote it.

So we have to take this step by step, right? So what disrupts micro oxide. But if you're using mouthwash, you have to stop, I mean there's a reason we don't take an antibiotic every day for the rest of our life. They're known clinical consequences to that.

So why would we disrupt and take an oral antiseptic every day for the rest of our lives. And the data tell us that 200 million Americans wake up every day and use mouthwash.

Supplements, Medications, and What to Avoid

And there's 200 million Americans with an unsafe elevation of blood pressure. It's not coincidence we and others have basically laid that to bed. But if you use mouthwash disrupted bacteria, decreased nitric oxide production, your blood pressure goes up. So if you're using mouthwash you have to stop you have to get rid of fluoride fluoride is a neurotoxin that causes neurological disease.

It kills your thyroid function and it's an antiseptic. So if you're using a fluoride toothpaste you have to get rid of the fluoride in your toothpaste, Buy a fluoride free toothpaste and then most municipal water supply they put fluoride in your drinking water. Why?

To purify and sterilize the water? Well it's also sterilizing your human body which as we know as clinical consequences. So I encourage people to get a home filtration system, remove the fluoride from their their drinking.

Why it's not just the drinking water, it's so whether they're bathing in the water they're cooking in to our bodies, it's covered with fluoride. And there's it's no we know the reason there's an epidemic of hypothyroidism? Because people are deficient in iodine and they're over exposed to fluoride. These are all allegations that compete with internet. And then the other thing is to be using an acid, get to stop and acid shutdown micro oxide production.

They prevent stomach acid secretion, they cause autoimmune disease proteins can't be breaking down and broken down into amino acids. These peptide fragments are absorbed across the gut or body develops antibodies against it in the basis of foodborne allergies and really most autoimmune disease.

So those are three things very simple. Stop using mouthwash. Get rid of full ride if you're taking an antacid stop now once you've done that the body is primed to actually heal and do its job. So then throw in some more green leafy vegetables. Modern physical exercise as little as 2030 minutes a day has been shown to be too stimulating promoted nitric oxide production uh sunlight. You know there's certain wavelengths of light both on the U. V. Spectrum and the infrared that can stimulate and release micro oxide production.

Deep breathing. You know nasal breathing. You know we have a high concentration of the snows enzyme in our nasal the sinuses that when we breathe through our nose that stimulates nitric oxide production effect.

That's why deep breathing has been shown to lower blood pressure. So that's it. Stop doing three things. Start doing four things and the body typically will respond very well.

And you know our whole process. Our whole thought process is chronic diseases caused by two things and two things only the body is missing something that it needs or exposed to something that doesn't. So if you replete missing nutrients find the source of exposure to toxins, whether it's infections or environmental toxins and you remove that then the body heals itself. That's how the human body is designed for regenerative beings. We just gotta get out of the way.

– Yeah, thank you. I love how like simple many of these things are. And the one thing I think that's not going to be

simple for people and listening to this is talking to their doctor about getting off of things like statins and proton pump inhibitors and you know proton pump inhibitors. Like my understanding of like you know approval of those is not even supposed to be used long term and I see people in my clinic sometimes on these things for decades. So do you have any advice with what you've seen on, you know, for people that are like wow I have a you know 100 and 99 you know total cholesterol or 205 total cholesterol like that should not be on statins for any reason and you know where these people with long term pp I use how to talk to their doctors about you know about some of this because I think that's gonna come up for people like oh I need to get off this thing but my doctor is not going to let me – Well unfortunately it's not the way Western medicine is practiced, right? There's never the conversation of how are we gonna wean you off drugs when most people go to their physician is if this drug isn't working let's talk about putting on another drug. And then that creates an environment where the human body cannot feel and actually get better.

So you know there's data now showing that people who have been on P. P. I. S. For 3 to 5 years have about a 40% higher incidence of heart attack and stroke.

I mean that's not increased risk that's actual events. So as you said these drugs were only approved for acute use 3-5 days. They were never FADA approved for chronic use and there's a reason they cause death.

So and I understand that gastroesophageal reflux is is a major problem. So what I encourage people to do to wean off these P. P. I. S. And by the way you just can't stop these cold turkey, you have to wean off of these or you get rebound over production of stomach acid will cause a lot of problems. So I tell people wean off take if you're on it take it every other day, do that for a week. Then every third day do that for three or four days then you can stop so your body has to slowly titrate off these drugs and then before every meal take a tablespoon of apple cider vinegar which is basically just acetic acid.

It'll acidified the lumen of the stomach. Now you can actually break down and digest the food you're eating and you won't get the the reflux and the regurgitation uh that's causing the esophageal reflux. So it fixes the actual problem.

Then there's no need to use these these P. P. I. S. Foreign assets. And then the other thing people don't realize is you got to ask the question what does it take to make stomach ask what are the pride?

All cells need to make stomach. Well they need iodine, they need zinc. They need some uh sodium bicarb. They need B. Vitamins. And if you can't make stomach as if you don't pee pee I guess you don't absorb zinc. You don't absorb iodine, you don't absorb the vitamins. You're setting up this perpetual system where the body is not able to do what it's designed to do.

So now you can start absorbing these. And you know I encourage people to take a daily I line something american diet does not have any iodine in it. And we need iodine for thyroid production. We need iodine for stomach acid production for our immune system.

You know it's how we fight off and that's why I uses a topical scrub for surgery right? Or was years ago. So that's that kind of addresses the stomach acid and then for the cholesterol the statins and if you look at the Framingham study which is the longest longitudinal study in the history of medicine. I think the people that live the longest have cholesterol between 2:40 and 260.

And to me that should be the guiding light and the guiding principle. There's never any evidence that I'm aware of. We're getting your cholesterol below 200 is help promoting you need cholesterol to make vitamin D. You need cholesterol to make estrogen, you need cholesterol to make testosterone.

So if your cholesterol is below 200 the vitamin D. Deficient we have an epidemic of low vitamin D. You have an epidemic of low testosterone. I mean I don't watch tv but when I do turn on the tv it's all about low T.

So we're creating this system where everything is perpetuated from drug therapy and if you take this drug we got this drug to solve this problem is caused by this drug and it's a great economic and financial model for big farming but it's a horrible model for human health.

– Yeah thank you for that. And for everybody that's listening I really encourage you guys to think about some of these you know stats that Dr. Bryan is sharing with us around P. P. I. S. And cardiovascular around the Framingham study and you know and where cholesterol levels could because what I've seen personally is like when people can actually go to their conventional dock with some of these stats and some of the research. It's an easier way to you know to be able to be more successful in working with them. – You know I don't want, I don't want to come across as being critical of physicians because I think For the most they're good people and they get in this profession to make a difference.

So it's not the doctors, that's the problem. It's the system, the system in which they're trained. You know, I was in academic medicine for for 15 years where I taught in medical schools and talk future physicians. So it's not that they're not good people trying to do the right thing is that there's just so much pressure by the standard of care that, you know, if you venture outside the standard of here, it basically becomes a liability. So medicine from my perspective is risk management and they're they're it's defensive medicine.

So they're so scared to go outside the standard of care and and putting themselves at risk for a lawsuit rather than trying to focus on if I look at the data, analyze the data and use my best medical, best medical judgment.

What's best for this patient and that I think that's where we have to do. – Yeah, Thank you for clarifying that. I think it's a really important point.

I could not agree more with that. It so I appreciate you clarifying that. And my next question really is a little bit more big picture since you are a researcher and you spent so much time collecting and analyzing data.

What do you feel like is the most surprising thing you have found about nitric oxide In the research. You've done? – Well, it really came down and Covid opened our eyes to a lot of things, right? And what we learned over the past three years was how important micro dockside is in our immune system.

Because with the Nobel prize being awarded was really focused on the cardiovascular effects of micro toxins in its role as a vassal dilator in delivering oxygen individual cells and tissues.

Practical Ways to Boost Nitric Oxide

But what we realized early on, you know, three months into the pandemic in March of 2020 the people that were getting sick and dying from Covid were the people who couldn't make micro toxins now, who were those those were the elderly African, Americans, people with a prior heart attack, pulmonary disease, kidney disease, obesity. The standard risk factors within the ethereal dysfunction. Low circulation inflammation, immune dysfunction. Not to be stressed with the people that are getting sick from Covid. And now we know that micro cox that is critically important. How are macrophages and neutrophils and immune cells go to the side of attachment.

So let's just use Covid for example, because we've all survived this for the past three years. Covid is a respiratory virus that attaches to the a three step on epithelial cells. And then when there's an attachment, our immune system recognizes that and say, oh we've got an innovation.

So we mobilize our immune system. We send the blood supply directly to the site of infection. and then our immune system generates a lot of nitric oxide. In terms of viruses it shuts down virus from replicating it's a bacterium. It binds to the iron sulfur centers of bacteria, shuts down the respiration and kills the infection where it doesn't propagate throughout the body. But if your body can't do that number one if you can't mobilize an immune response which people with like nitric oxide can't.

And then if your immune cells can't make nitric oxide then that virus replicates propagates throughout the body causes vast for inflammation, loss of oxygen saturation, hypoglycemia, your ventilated and you die. That's the course of events early Covid.

So then we we developed a nitric oxide drug and we got our I. N. D. Approved in June of 2020. So for the past two years we've been treating high risk really susceptible.

Covid patients has an early treatment with micro oxide and we're finding really enormous benefit. And these are the sickest of the sickest patients that if they're exposed to Covid within 72 hours we start them on our nitric oxide drug and we improve blood oxygen saturation by 15 to 20%.

The onset of symptoms is reduced the time of symptoms is reduced. So everything we've learned about Covid and it's not just Covid it's seasonal flu it's rsv respiratory any respiratory viruses the same ideology is the same.

And the people saying people who got sick and died from the flu every year, the same people got sick and died from. So it's not a new disease in terms of understanding mechanism and treatment, it's just focusing strictly on restoring the production of micro fox side and letting that molecule do its job in the human body. So that to me was the most surprising thing of nitrogen oxide. But to me, I think it's probably the most profound observations we've seen in medicine in the past probably since the discovery of penicillin in terms of immune function and in combating invading pathogens.

– This is thank you for sharing that. I think that particular fact, like we can extrapolate and actually really apply it to this entire summit because so everybody is talking about various components of, you know, of microbial health, good and bad. And we're saying from the bad perspective, we already talked about the good perspective, we're seeing from the bad perspective, we have these microbes that have been linked to being part of the group cause of mental health issues and then we can have nitric oxide which comes in as supporting the immune system, supporting the white blood cell function that really just applies to literally everything we're talking about this entire week. So that is super exciting.

Is there anything that you feel like we have not talked about today that you feel like it's really important to include? – Well, I think, you know, I come from a very strong bias because I live in this microcosm of micro oxide and everything. I've done everything I do is enough but I want you know its foundation and everything we do. It supports blood flow and circulation, oxygen delivery. It's the protective mechanisms on inflammation which is really the silent killer and most chronic diseases.

But again I don't want to I don't want to come across as nitric oxide being a panacea. It's not an indoor cure all be all it's not a silver bullet because if you've got some pathogen or some like heavy metal for example causing neurological disease, nitric oxide is not going to fix that, you still have to kinda dig a little bit deeper and get to the root cause of the disease and the symptoms.

But here's what I do know based on the science, your body cannot and will not heal unless you have sufficient nitric oxide production. But that doesn't necessarily mean that that's gonna cure everything.

You still have to fix the underlying problems. If there's a nutrient deficiency, if you're low in vitamin D, nitric oxide is not gonna fix that right.

If you're low in selenium and chromium and other trace minerals, nitric oxide is not going to compensate. So you have to fix the underlying problem.

Clinical Perspective, COVID, and Closing Remarks

But nitric oxide is what allows the body to communicate and signal and allow those nutrients to get where they need to go, allow the immune system function properly and actually mobilize our own our own stem cells and regenerate and heal the body And from a simplistic standpoint that's all that micro oxide does.

And so again you your body you can't live without it. You cannot deal without it, your body cannot perform. That is true potential without sufficient micro toxin.

– So we could probably say that you know root cause perspective and we're talking very holographic lee that there's a lot of we're looking at a pie chart of what the root cause of somebody say mental health or other chronic disease.

But since we're focusing on mental health we can say we have a lot of different pieces of the pie. Right So we're talking you're bringing up toxins, you're bringing up metals are bringing up all sorts of other infections, a lot of other things we could throw into the pie puzzle.

So it sounds like the nitric oxide. You know part is likely going to be a part a piece of the pie that we should consider probably most of the time but it's not going to be the only piece of the pie that we should consider.

Right okay perfect. Well this has been so wonderful and so informative and I wanna make sure we save a moment to tell everybody about you're giving away your e book to our listeners so you guys you can get that on Dr. Bryan speaker page can you tell us a little bit about the book you're giving away.

– So it's my third book playbook, it's called functional nitric oxide nutrition. But the whole point was to um you know, educate the layperson, the general public, the masses on the importance of micro toxin.

So what I've done is taken a very complex science and put it into a really easy, understandable read and then you know suggest some simple practical lifestyle changes and hopefully, you know, my feedback I get is a lot of people have this aha moment, oh I didn't know that and I'm doing this and that may be causing this and then people start to put the pieces of the puzzle together by themselves.

So it really explains probably 30 years of micro oxide research and discoveries into about a 90 minute to our read. But it will tell you everything you need to know about mycotoxin, – Perfect. And so many times you guys, I find that when people are understanding the why this is important, like why we need to do some of the things like Dr. Bryan talking about why we need to filter our water all these different things. It's so much helpful for motivation standpoint.

So I really think that you know, getting this for you guys that will help motivate you to just have a different level of impulse to make some of these changes and anything else.

You want to tell our listeners about how to get ahold of you. – Yeah, you know, I send people to my educational website, I'm not here to sell you anything, just provide some some good accurate education and information.

It's drnathansbryan.com. There's a six minute video on there. I do a monthly blog and try to provide some timely practical, you know, information that hopefully is useful. And, you know, the most gratifying thing that I do is getting the hundreds of text emails and phone calls of people that we've changed their lives because they've been dealing with chronic disease for many, many years. And this kind of seems to be the missing piece in their treatment plan. And so to me, that's the most gratifying thing, but it's clear that you know, nitric oxide is foundational and everything we do.

And I encourage people to be proactive instead of reactive. Unfortunately, people don't take action until there's a crisis until they're sick or they've had a heart attack. But I think our job sitting here today is to get people's health front and center and then take corrective actions before you develop symptoms. And before you get sick, – Thank you.

Thank you so much for all of that. Thank you for being here with us today. Really appreciate your time and expertise. – Thank you. Thanks for having me.