Top Takeaways: #313 Nitric Oxide Deficiency and Its Role In Detox and Heart Disease with Mackay Rippey

1. Nitric oxide is a tiny molecule made up of 1 nitrogen and 1 oxygen which can diffuse through anything in the body and acts as a signaling enzyme, receiving signals or making signals to create a multitude of functions in the body.
2. This molecule is involved in sleep, digestion, sexual function, heart disease, memory, detoxification, and many others.
3. Due to factors like aging, nitric oxide enzyme after time can turn into an enzyme that produces something called superoxide, which is a free radical that can be damaging to the body.
4. Superoxide can react with nitric oxide to create something that is highly reactive call peroxynitrite, due to enzyme uncoupling, which can be caused by EMF and toxins.
5. When a cell gets too stressed, superoxide can form, and, if not tagged by our body for recycling or elimination, can cause genetic problems that can lead to cancer.
6. One way to prevent this from happening is through supplementing with nitric oxide.
7. UVA from sunshine, infrared saunas, exercise, and devices like the Zona Plus, which helps bring down blood pressure, can produce nitric oxide.
8. The toxin BPA signals a compound called Angiotensin to raise your body's blood pressure, and up regulates nitric oxide synthase, which combined, causes nitric oxide synthase to uncouple and form superoxide and peroxynitrite.
9. This will cause a cell to pause its cycle long enough to repair DNA before it tries to replicate again, but if it doesn't repair, the cell will be retired and create accumulation damage, which is how heart disease happens.
10. Signs of low nitric oxide levels are elevated blood pressure and erectile dysfunction, but low nitric oxide levels can be involved in many issues, and is even associated with bipolar depression, aggression, schizophrenia, sleep, and memory.
11. One of the best ways to biohack your body and control your nitric oxide levels is through genetics and genetic testing, looking at you nitric oxide genes, and creating a diet plan that can properly suit the way your body works on a genetic level.
12. Mackay's myDNAhack, a DNA testing kit that identifies your nutritional weaknesses and creates a custom nutritional protocol that will supplement missing nutrients and use herbs to aid in the production of needed enzymes to ultimately reduce the damaging oxidants and support healthy cells function.

13. To order your genetic test kit and learn how you can improve your health based on your genomic nutritional weaknesses Click Here!
14. Get $100 off your test kit. Use the code "myersdetox" at checkout!
15. Make sure to tune into his Lyme Ninja Radio podcast at lymeninjaradio.com

Wendy Myers: Hello everyone. My name is Wendy Myers. Welcome to the Myers Detox Podcast. You can learn more about detox at myersdetox.com and check out everything that we're doing over there. We have hundreds of articles on detox, detox supplements, tons of information and instructions on detox protocols like infrared saunas and coffee enemas and just tons of information totally free that I worked very hard to provide for you guys. All scientifically-based. Every article has at least 5 to 10 times more scientific study references to support everything that we're stating here.

Wendy Myers: Today, we have a really interesting show with Mackay Rippey. He is going to be talking about nitric oxide deficiency and its role in detox and heart disease. This is a really, really interesting show because I originally started taking a nitric oxide supplement. I tested low on it and I was kind of surprised because I do a lot of things that increase or supposed to increase nitric oxide production in your body. I'm working on this little part of my health and thought I would share it with you.

Wendy Myers: Today, we're going to be learning about symptoms of nitric oxide deficiency including reduced detox ability, why nitric oxide is critical for heart health and healthy blood pressure and arteries, and the top five ways to increase nitric oxide, toxins that lead to cardiovascular disease and also interestingly why Viagra doesn't work sometimes and it's because you need nitric oxide.

Wendy Myers: For some people out there, the Viagra is not working for them or their husband, they need to add at nitric oxide to the mix. Really, really interesting show today. We also get into functional genomic nutrition and why some diets don't work for some people and why you really need to deep dive on your genetics to learn what type of diet is right for you so you don't have to keep guessing and try all these different diets and get sick from one.

Wendy Myers: A lot of people try a lot of fad diets like keto or try veganism or they try other things and are not well and are on these really restrictive diets that may not be working for them. Doing genetic testing that make Mackay Rippey offers can be really, really helpful to just figure out the puzzle, what diet works for you, what should you be eating.

Wendy Myers: I know you guys who listen to this show want to learn about detox and more importantly what toxins are in your body affecting your health and how to detox them.

Wendy Myers: Well, I created a quiz. It's at heavymetalsquiz.com. I created some this lifestyle questionnaire that you can answer and it will give you a score. Once you get your results, you'll get a free video series to discuss what your results mean, what's the next step to take to detox your body, where do I start because a lot of people know they need to detox but they aren't really quite sure what is the first step that they should take. I explained all that in this free video series you get after you take a quiz at heavymetalsquiz.com.

Wendy Myers: Our guest today Mackay Rippey. His interest in genetics toxicity and nitric oxide was a result of waking up one morning unable to lift his right arm. After the panic subsided and he realized he was not having a stroke, the most likely cause seemed to be a Lyme disease flare-up.

Wendy Myers: After what he thought was successful treatment, he visited urgent care, the ER, an orthopedic surgeon, his primary care doctor, a neurologist and they confirmed it was not a stroke but had no idea how this nerve damage could happen.

Wendy Myers: Since the doctors didn't know, Mackay became determined to find out what was going on. Not able to work for three months, he dove into his genetics and discovered the vast literature describing nitric oxide mediated nerve damage and charted his path back to health. We'll talk about the pros and cons of nitric oxide on the show too.

Wendy Myers: Mackay is a member of the research team for the Functional Genomic Nutrition Institute and regularly presents at their conferences. He was one of the first practitioners in the country to earn a Master's Degree in Acupuncture from the Maryland University of the Integrative Health and he lives on a small farm in Central New York where he has been practicing five element acupuncture for the past 20 years. You can learn more about Mackay at mackayrippey.com.

Wendy Myers: Hey, thanks so much for coming on the show.

Mackay Rippey: You're very welcome. I'm very excited to be here.

Wendy Myers: Why don't you tell us a little bit about your story and how you got into the health field?

Mackay Rippey: Wow. Health field, well this, let me ... It goes way, way back. My mom was bipolar. We had some interesting moments growing up and I distinctly remember some doctor saying, "Your mother has a chemical imbalance in her brain and we're going to balance it." They never did. They never did.

Mackay Rippey: Then, at some point, life goes on. My parents separate and I'm home from winter break St. Mary's College of Southern Maryland. My dad's living up in DC. I'm up in his apartment. He started getting acupuncture and I have no idea why because he's not what you think of somebody

who gets acupuncture. He was in the banking industry, on the lobbying side of things but he's got this material laying around the house and I start reading it and it's fascinating.

Mackay Rippey: What they're talking about is if you follow nature's laws, you're going to be healthy. The further you stray from those paths, from those laws, the more likely you are to get sick. They had an alternate explanation for health and disease and not chemicals and stuff that the doctors thought that you were talking about but really didn't. So I grabbed on to acupuncture is like, "Wow, this is amazing. I have to go study with these people." I did. That started my acupuncture career.

Mackay Rippey: Fast forward, I'm treating people with acupuncture, studied with Bob Duggan and Dianne Connelly's five element acupuncture. We moved to Upstate New York and I got bit, not up here but down around the Hudson River by a tick and I didn't know it at the time. I didn't feel it, didn't see it, got really sick in the middle of summer just like the super bad flu. I was feeling so terrible.

Mackay Rippey: I remember one Sunday morning crawling, almost literally, it may have been literally, to the bathroom, pull myself up, looked at my eyes in the mirror doing one of these deals like, "Wow, man, you look really bad," kind of deal.

Wendy Myers: You're like thanks.

Mackay Rippey: Yeah, exactly. Doing this and I looked down and on my arm is the bull's-eye rash. I think to myself, "Holy smokes." Now, at that point, I was so uninformed about Lyme disease but when we were down in the Baltimore area, my wife had worked with Johns Hopkins School of Public Health, she'd come home every day with a new way to die and one of those ways to die, I remember was Lyme disease.

Mackay Rippey: I saw this bull's-eye rash and says, "It's Lyme disease," and the strangest thing Wendy, I felt instantly better because I had to diagnose, even though it was self-diagnosed, I had a diagnosis. I didn't feel sick anymore and was crawling to the bathroom two seconds before that. Anyway, go down, long story short, go down the ER, everybody on duty comes down and look at the rash and goes, "We've never seen one of these before." Everybody looks at the rash. They gave me 10 days of doxycycline. I take it. I follow up with some acupuncture and some herbal medicine and I thought that was the end of it, right?

Mackay Rippey: Two things happened: one is I do think in retrospect that I lost a little bit of vigor, like energy. My just strength. That's the wrong word, not physical strength but my endurance had just seemed to be dialed down a little bit.

Mackay Rippey: Now, I could still do everything I wanted to. I didn't have to take days off but it just wasn't quite the same and lost hairline, lost about a half inch of

hair. My wife definitely pointed out and said, "Where did your hair go?" It disappeared since you had Lyme disease.

Mackay Rippey: Fast forward 15 years, I'm fine, more or less. Wake up one morning and I can't move my right arm and my immediate thought is you're having stroke. I kind of do mental checklist. It's like, Well, it doesn't seem like a stroke." The next thought is, "This is Lyme disease. You're having a flare of Lyme disease." I'm between there. I had started a podcast at Lyme disease that specialized for Lyme disease in my little community because nobody was taking care of these people. Somebody had to, at least to get them out of the area to Lyme literate physicians. We had to do something.

Mackay Rippey: That basically morphed into extreme pain, sleepless nights and I had to leave my work for three months. I lost three months of my life but in the meantime, I had been beginning to study genomic nutrition, genetic-based nutrition and had my own analysis.

Mackay Rippey: I started looking at my own genome and looking at what goes onto damaged nerves, what could be going on here? Let me tell you I went to Urgent Care. They sent me to the ER. ER sent me to orthopedic. Orthopedics said, "That's not injury. It's neurological. Good luck." The neurologist said, "Did you injure yourself? Did you injure yourself? Did you injure yourself?" Hundred ways. Do you ski? Did you live with something?" Da-da-da-da-da. No, no, no, no, no. He says, "Well, sometimes these things happen. Good luck."

Mackay Rippey: I was really left on my own. They didn't have anything. My primary says he'd give you gabapentin. I said, "I'm not really interested in medications and thanks. I'll take care of myself."

Mackay Rippey: I did an herbal protocol. I did Cowden's Protocol and that didn't really budge things. I was like, "Okay. The affection is not active. Whatever hit me, isn't active. It's more of a detox and a healing type of thing." I started looking into it and nitric oxide keeps coming up again and again and again. It came up in my genome report and it came up in my research about nerve damage.

Mackay Rippey: What was fascinating to me and I'll pause here to let you kind of jump in because I could just talk about this for literally hours, on one hand, there are a bunch of papers. I went to the original sources, bunch of papers saying, "You need nitric oxide. Otherwise, the nerves will get damaged," and on the other hand they're saying, "Nitric oxide is damaging your nerves." I was like, "Who's right, right?" I want to know who won this debate.

Mackay Rippey: I started getting into it. We can talk it later about why they aren't actually opposed to each other. They just seem to opposed to each other.

Wendy Myers: Well, then, let's talk about it. What is nitric oxide and let's talk about some other details about some benefits of it because I recently discovered that I

had low nitric oxide. I did a little saliva test for it. Mine was really, really low and I thought, "That's weird. I never really thought about nitric oxide before increasing levels in my body or measuring it. Tell us about what it is exactly?

Mackay Rippey: Nitric oxide is this really tiny molecule. It's a molecule made up of one nitrogen and one oxygen and basically it's got a backstage pass to the body. It diffuses through everything. It can do whatever it wants to do, go wherever it wants to go. It's fair. It's actually a radical but it's not that reactive. It's not like a, do you know the hydroxyl radical? Have you heard of that?

Wendy Myers: Yes, mm-hmm (affirmative).

Mackay Rippey: Right, so it's not like the hydroxyl radical when once it's made, it's reacting to what's ever nearby and doesn't go anywhere. The nitric oxide is a little more selective with what it reacts with. It has more of an effect of a signaling molecule. That's kind of a ... That's why when the nitric oxide was the molecule of the year and won a Nobel Peace Prize, I forget in the '90s something like that, because of this signaling function. It's involved with literally everything.

Mackay Rippey: One of my favorite things to do is what I'm listening at a health lecture is I'll sit there on my phone, I'm one of those rude people who's always on their phone, what I'm doing is I'm Googling whatever they're talking about and nitric oxide and I'm telling you it's more than 9 times out of 10 there's a link. There's amazing. It has to do with sleep. It has to do with digestion. It has to do a sexual function. It has to do with heart disease. It has to do with memory. It has to do with detoxification. Just everywhere you look, nitric oxide is part of the signaling cascade either receiving the signals or making the signals to make these various functions happen.

Wendy Myers: Why do someone's levels of nitric oxide get low?

Mackay Rippey: Aging, which we're not doing, right?

Wendy Myers: Yeah.

Mackay Rippey: We're going backwards. We're getting younger. Aging, just like any other enzyme in the body, it becomes less efficient. My question is on this enzyme, I don't have an answer for this. Maybe you have an answer for this. Are the enzymes slowing down because of genetic damage accumulation over time and they're just not as good enzymes or is it that we've got oxidative stress built up and the enzymes aren't functioning properly or our bodies are too cool or too acidic or too basic so the enzymes aren't as efficient? What exactly is going on? Because we all know people who are healthy when they're older, right?

Mackay Rippey: Like vigorous, you look at the woman or the man and they're ... I don't know. My father-in-law's he's 80 some years old and he's out taking care

of the cows every day. I was like, "What are you doing?" He puts me to shame, splitting wood and stuff like that. He's twice as strong as I am and he's 82. I'm 55, what gives? Something like that. Is it just literally aging or is there something else going on? That's one.

Mackay Rippey: The other thing is the nitric oxide enzyme seems to have another life and it turns into an enzyme that produces something called superoxide, which is another free radical, which is a little bit more damaging but an even more interesting, it's part of the immune system. When an enzyme like nitric oxide produces superoxide and then there's other enzymes that produces as well.

Mackay Rippey: The superoxide combines with the nitric oxide to form something called peroxynitrite. I don't know if you ... Have you done podcasts on that?

Wendy Myers: We have not.

Mackay Rippey: [crosstalk 00:16:02]. Here's kind of the end story to ... What's the difference between ... Nitric oxide is this terrible, horrible molecule and must be stopped versus nitric oxide is the savior of the world and everybody needs more of it. What happens is when the enzymes become what's called uncoupled, it makes more superoxide and basically uncoupling happens when the cells are under stress or duress. EMFs will do that. Toxins will do that.

Mackay Rippey: Now, we've got this peroxynitrite being made and this thing is super reactive. It reacts in lots of interesting terrible ways and if it's not broken down by glutathione or some other antioxidants, what will happen is it starts combining and then the chemicals it makes when it combines with various things like for example, carbon dioxide.

Mackay Rippey: Peroxynitrite plus carbon dioxide and we all have lots of carbon dioxide in us, right? Ourselves are springing it out all the time. That's what we exhale. Carbon dioxide and peroxynitrite makes something called a carbonate radical. The carbonate radical loves to eat up your DNA. This is one of the sources of this DNA.

Mackay Rippey: Chances are because you ... This is a long answer to your question, because you have low levels, you probably have some NOS uncoupling going on and some hidden inflammation. That would be my guess. [crosstalk 00:17:33].

Wendy Myers: To raise the levels, perhaps have to produce inflammation, reduce toxins but can they supplement with nitric oxide to increase the levels until they can fix these other things causing problems in the background?

Mackay Rippey: Right, that's where things get very interesting and that's where I like the genetic testing to give us some ideas like where should we be supplementing. One of the things we talked before you hit record was you're supplementing with the product and we can show it.

Wendy Myers: Yeah, I'm taking it right now. I'm taking Berkeley Life Professional ...

Mackay Rippey: Berkeley Life Professional.

Wendy Myers: ... Because I did the test, the saliva test and showed that I had low nitric oxide levels. I was giving this to supplement with it but it may not be that simple.

Mackay Rippey: It isn't but it's a good place to start. I was down in Hershey this past weekend with Beth Shirley, who's the scientific adviser for Berkeley Life and we presented about this topic together and she explained so what that product does is support a non-enzymatic pathway to produce nitric oxide.

Mackay Rippey: If your enzymes are struggling because of oxidative stress or just because your body's not expressing them, it's not making them. Expressing just means the body's taking the DNA and making the enzyme out of it. If it's not expressing it, then you need the secondary path like this to boost and some people think and I'm not against this 100%, I just think there's more to the story.

Mackay Rippey: Some people think that you should be on at a supplement like that like a multivitamin, that should be your multivitamin. That's a pretty actually convincing case. Again, and it's not the whole story. That would be a good place to start but then and I want to say, you need to take care of your enzymes as well and there are a couple ... Again, there are a few reasons why these enzymes are producing super these enzymes are producing superoxide instead of nitric oxide and it's really, again, that's a stress signal within the cell.

Mackay Rippey: The cell gets stressed too much if it isn't retired taking out goes through what's called apoptosis, tagged for retirement and it gets recycled. It gets eaten up by macrophages. This proteins are recycled. If that doesn't happen, then you stand the chance of accumulating genetic problems, genetic polymorphism, sorry, genetic alterations and cancer, right? That's kind of what we think the source of cancer or some people think the source of cancer is.

Mackay Rippey: You want to get that cell out of the system. It's like it's time to go away. You're causing problems. It's like having a disease plant in the middle of your garden. You got to take it out before the fungus spreads to the rest of the garden.

Wendy Myers: Yes. One way is to supplement with nitric oxide. Are there are other ways to naturally to support nitric oxide production?

Mackay Rippey: Yes. I'm going to hold up, which is the right ... I want to get the right one. This is one of the supplements I got. This is only available through doctors. If we have practitioners out there listening, go to Functional

Genomic Nutrition and we'll maybe talk about this a little bit later on. It's a great program. You get certified and learn how to read this stuff.

Mackay Rippey: I wanted to bring this up at some point, Wendy. I forgot about this. I should have sent you a genetic test kit so we can talk about that. I'm going to do that. I'm going to send you one.

Wendy Myers: Oh, thank you. Thank you.

Mackay Rippey: What's really interesting? Not only we can look at your nitric oxide genes, we can look at your detox genes because we've just expanded ... We think environmental toxicity is a big problem as you do. We've expanded like the CYPs, the phase one detox. We've got all these phase two pathways that we're just learning about glucuronidation and sulfation and glutathione conjugation, all these great pathways that are really, really important for taking toxic substance out.

Mackay Rippey: If you have a block in one of them, you can adjust and kind of overlap but some of these pathways are very narrow and there's not a whole lot of options for some of these substances. Sunshine.

Wendy Myers: Yes.

Mackay Rippey: When sunshine, particularly UV8, we know the UVB rays do vitamin D. The UVA do nitric oxide.

Wendy Myers: Don't bacteria on your skin make nitric oxide when exposed to sunlight?

Mackay Rippey: I don't know if that's internal or external. I thought it was internal. It was actually some nitrate in the blood gets converted over to nitric oxide. There are bacteria on the skin that do convert to nitric oxide. That is correct as well. I don't know if those are related or not actually. You've stumped me, stumped the expert.

Wendy Myers: Yeah, well, I just read that somewhere. I don't know how much this bacteria is nitric oxide skin production contributes to overall level but ...

Mackay Rippey: [crosstalk 00:22:51]

Wendy Myers: ... I read that.

Mackay Rippey: Yeah, the skin probiotic people, what's their name? They have to pump.

Wendy Myers: Oh gosh.

Mackay Rippey: Exactly, okay. We both forget that.

Wendy Myers: [crosstalk 00:23:01]

Mackay Rippey: When the camera's on, you don't remember anything.

Wendy Myers: Yeah.

Mackay Rippey: It's amazing. You go, "I don't know."

Wendy Myers: Getting sunlight is one way. Are there any-

Mackay Rippey: [crosstalk 00:23:10] sauna.

Wendy Myers: Sauna? Okay, great, infrared saunas?

Mackay Rippey: Yes, because the heat shock protein activates endothelial nitric oxide synthase. You get more nitric oxide. If you think about it, you get hot, you need to be able to bring the blood to the surface to cool it off. You have to open up the blood vessels. That's a good one. Exercise, Dr. Mercola has a hysterical video out there. He calls it the nitric oxide dump. If you'd like to be entertained and do some exercise, you can do this like in any room in the house at any time. It's a great exercise.

Wendy Myers: He personally showed me that.

Mackay Rippey: Oh, did he?

Wendy Myers: He's really excited about the nitric oxide dump.

Mackay Rippey: He's excited about life isn't he?

Wendy Myers: He's excited about health. He loves health.

Mackay Rippey: When he was out in Denver with us presenting, he decided that it was a good look not to wear shoes.

Wendy Myers: Yeah.

Mackay Rippey: Everybody else was like jackets and shirts and some of the doctors are in ties and there's Mercola in his T-shirt and jeans and no socks or shoes.

Wendy Myers: He always has to be grounding, always at all times.

Mackay Rippey: Yes, in the middle of a hotel?

Wendy Myers: Yes. Yes. There's an exercise. There's a set, if you want to go on mercola.com you can look at the nitric oxide exercise or something. He's waving his arms and doing all these different things that increase nitric oxide. Is there any other ways that you can tell us that naturally increase it?

Mackay Rippey: There is. If you need a little more guidance, there's a device out there called Zona Plus and it's a handheld device, I don't have mine with me, that you squeeze and it measures your grip strength so it calibrates it. It doesn't matter. You don't have to be strong. It's like you don't have to generate 20 pounds of force or anything. It calibrates it to your strength. If you're 70 years old and have a strong grip and if you're 20 years old and have a weak grip, it'll adjust to that. Then, you hold it for two minutes, switch the other hand, two minutes, go back and forth twice.

Mackay Rippey: In doing so, they have really good studies showing that it brings down blood pressure about 20 points on the systolic and 10 points on the diastolic simply by squeezing this thing.

Wendy Myers: Interesting, because nitric oxide is involved in regulating your blood pressure so your veins or your arteries expanding or contracting in response to stress. How does this relate to heart disease? Why is nitric oxide so important for heart health?

Mackay Rippey: We all ... Well, first, let's back up. Heart disease is a huge problem, right? People, the stats in the US are just terrifying like every 50 seconds somebody's having a heart attack. There are millions, 28 million, 38 million, something like that in 2016 with heart disease. It's just the numbers are massive.

Mackay Rippey: The other thing to think about is the rise in heart disease over the years. We all know about the rise in toxicity. Is there a correlation? Who knows? That's where the epidemiologists to figure out but it's suspicious. There is decent research out there about toxicity and heart disease.

Mackay Rippey: In fact, I came across this book published by Elsevier and they are a publisher of a lot of studies. They have an entire heart disease and toxicity book. It's 680 pages of most depressing stuff you could ever read, right? Because they're going through military toxins and household toxins, it's just awful. There's plenty good studies in linking the two.

Mackay Rippey: I was preparing for presenting in this Denver Genomic Conference. That's where I met Mercola. I wanted to bring in toxicities. I've decided to focus on BPA and I see you've done quite a bit on your podcasts about BPA. We don't really need to rehash exactly what BPA is but basically 2003 EPA gets 2,500 people to pee in a cup and 93% of those had BPA in their urine. We've all got it.

Wendy Myers: This other 7% their kidneys weren't working.

Mackay Rippey: That's right but kidney or their detox pathways are blocked and they can't get it out. They're actually worse off than the people who are peeing it out. We've all got this in our system.

Mackay Rippey: BPA does two things: It interferes with the angiotensin pathway. Angiotensin is a compound. It's produced in the kidneys. Usually, when

we have low blood pressure or low sodium and then the second part is producing the lungs. It's a two-step process. These chemicals have to bond to each other to activate a rise in the blood pressure. BPA tells angiotensin that you need to raise the blood pressure. That's number one.

Mackay Rippey: Number two is it up regulates nitric oxide synthase 3. It's kind of counterbalanced itself some. That's not why everybody who has exposure has high blood pressure but what also happens is this angiotensin starts to put stress on the endothelial cells and the nitric oxide synthase becomes uncoupled and starts producing the superoxide.

Mackay Rippey: Now, we get into this cell danger response. The cells starting to accumulate more and more stress signaling instead of making nitric oxide, which is basically the body saying, "We're working hard but everything's okay." It starts producing superoxide and peroxynitrite that says, "We're working hard and we're in danger."

Mackay Rippey: In fact, if there's enough of this, the cell will pause its cycle long enough to repair DNA before it tries to replicate again. It'll pause its reproductive cycle so it can do that and try to get things right. If that doesn't happen, then it just waves the white flag and says, "Okay, we're done. We're retiring. Take us out." Even more accumulation damage and this is where you get the heart disease. Necrosis starts to kick in.

Mackay Rippey: Necrosis is a cell death that's uncontrolled and once the body sees these cell parts kind of flying out in the cytoplasm, the immune system doesn't like that. It sees extracellular ATP and it goes on full alert. It says, 'There's an invader here." It sends it all to white blood cells. You start getting inflammation and this is where you get the damage inside the blood vessels. This is where the damage accumulates.

Mackay Rippey: Then, what's interesting that happens, not only do you have this damage here, but you have this lack of nitric oxide to have this damage, then you have this constriction because you can't vasodilate. You get this constriction damage. Then, you get lack of control over things like other immune cells.

Mackay Rippey: Nitric oxide, part of its path, is that it calms down other inflammatory molecules and other inflammatory enzymes. It down regulates them. This is where back in the beginning we talked about nitric oxide is wonderful. Everybody needs it. It has these amazing properties. If we're not producing enough of it, it's turning into peroxynitrite. Things start to spin out of control.

Mackay Rippey: One of the things that nitric oxide comes down is mast cells. Now, we're all hearing about mast cells and mast cell activation and mast cell degranulation. The mast cells start coming into the heart because that's where the damage is and now you have a spasm that's caused by the histamine being released.

Mackay Rippey: You've got these tiny little arteries that are blocked up because there's damage and because they're constricted. There's dead cells all around there. Then, you get the spasm happening causes massive histamine dump. Then, you're calling 911 if you're lucky or that's it, if you're unlucky.

Wendy Myers: Yeah and that's unfortunately the fate for so many people. My grandmother passed away from a heart attack and so did her father. My father had so many different heart issues and suffered from cardiovascular disease.

Wendy Myers: This is something we have to pay attention to. We need to be paying attention to our nitric oxide levels and why they're low. Live an overall healthy lifestyle but it helps to be paying attention to this marker. This is not a marker that medical doctors are testing.

Mackay Rippey: It's a shame. It's so easy especially the saliva tests. You can do a urinary or blood nitrate ... Actually, what the strip is testing is nitrite, which is a downstream marker from nitric oxide. It's actually very difficult to measure nitric oxide because it's a gas and it lasts maybe, maybe a second in the cells but probably a lot less than that.

Wendy Myers: Yeah. What are some of the symptoms of low nitric oxide and maybe we can talk about Viagra a little bit in that conversation.

Mackay Rippey: Sure.

Wendy Myers: Let's talk about some of the symptoms.

Mackay Rippey: It's important. Wow, there's so much to say here. Basically-

Wendy Myers: Is erectile dysfunction as a sign of low nitric oxide that then [crosstalk 00:32:38] ...

Mackay Rippey: They go together, right?

Wendy Myers: ... precursor to heart disease, potentially.

Mackay Rippey: They absolutely, they go together but that's just see, excuse this use, but it's only the tip of the iceberg. It's absolutely connected. One of the three types, let's start here, the three types of enzymes in the body that make the nitric oxide, there's the endothelial, there's the immune system or inducible nitric oxide and then there's the neuronal nitric oxide.

Mackay Rippey: Now, these names are terrible because really their studies, really good studies out there showing they work together as a team, if one kind of slacks off, the others will fill in their place. It's not like just endothelial nitric oxide works with the endothelium and blood pressure and that's all it does. No. It's expressed all over the place. There are endothelial cells everywhere.

Mackay Rippey: Again, it has to do with fertility. It has to do with the bio flow at the liver. If you've got constriction and the vessels is going out of the liver, you can detox like a champ but it's just going to back up, right? You can see why this is super important.

Mackay Rippey: I was just reading papers about the neuronal nitric oxide. It's involved with bipolar depression, aggression, schizophrenia, again, sleep, memory. Again, this amazing sleeping module. You asked me what the symptoms are and almost my answer is what do you got? However, that's why those strips that you have are so wonderful. If somebody is sick with anything and you do this, the spit test, and your nitrate levels are super low, then you've got an issue, you've got an issue and you need to begin exploring that. Of course, elevated blood pressure is one. We can start there. Erectile dysfunction is another obvious one and they're related.

Mackay Rippey: Now, Viagra and drugs like that, don't actually work on the nitric oxide. They work on the GMPC's, I forget, the downstream chemicals that the nitric oxide triggers to make the vasodilation happen. They're affecting the downstream effect of nitric oxide.

Mackay Rippey: If you're taking Viagra anything like that and it's not working, chances are your nitric oxide. You have to have nitric oxide to make the Viagra work. There are people just had a very nice doctor we had a conversation in Denver. He comes back to the Hershey conference we just had and he pulls me aside and he says, "Thank you. Thank you. Thank you." He says, "Things are much better." I was like, "What things?" "You know things are much better."

Wendy Myers: Yeah. That's just the tip of the iceberg.

Mackay Rippey: That's just the tip of the iceberg. He was using the Berkeley. He started off with a Berkeley Life product.

Wendy Myers: Okay, great. Fantastic, fantastic. We know it works. Let's talk about the pathway, what pathway leads from toxins to cardiovascular disease because we know that toxins are a huge contributor to cardiovascular disease. Can you talk more about that?

Mackay Rippey: Again, this goes back to the angiotensin pathway. This is my ... I'm going to go out on a branch here, a limb and I don't think it's too thin of the limb but what I researched very closely was BPA mediating this eNOS uncoupling and all this oxidative stress, I believe the same pathway gets activated for many, many different toxins and remind me we could talk about EMFs too. It's slightly different but it's very, very similar.

Mackay Rippey: What happens is the toxin comes in, the body recognizes it and for whatever reason, it activates the angiotensin pathway. Again, the body thinks it's going into shock. It says, "Let's raise your blood pressure," except you're not in shock. You're just being poisoned.

Mackay Rippey: Downstream from that, also then it begins to affect the integrity of the nitric oxide synthase. Instead of producing nitric oxide, it's producing the superoxide, which then combines to make the peroxynitrite.

Mackay Rippey: Your cell, instead of swimming in warmth and fuzziness, is now swimming in its own toxic oxidative soup. If it can't turn that around, if there's not enough glutathione in the cell, if there's not enough BH4 that can be recycled, if there's not a vitamin C, vitamin E, antioxidants like that, then the cells starts breaking down literally. Things start falling apart. Membranes start breaking down. The DNA eventually gets damaged as well and then at some point, the cell calls it quit or if the oxidative damage happens too quickly or overwhelms the entire system because this has been going on forever, your head's next to your router at night for 20 years, at some point, you're just too much damaged, your body can't catch up.

Mackay Rippey: The EMF toxicity happens through calcium channels. It excites these calcium channels. Nitric oxide is activated when calcium goes into the cell. It's a little more complicated than that but that's close enough. Again, what happens is the synthase, the nitric oxide synthases get excited but not only is it exciting the nitric oxide, it's exciting the rest of the immune system that says, "Something's not right here."

Mackay Rippey: The body's producing these superoxide molecules in other places beside the NOS. They start combining forming the peroxynitrite, forming other things hydrogen peroxide, creating the oxidative damage, the nitric oxide synthase becomes uncoupled and again this inflammatory feed-forward loop gets going and gets worse and accelerating and accelerating. You add on top endocrine disruptors, plastics, glyphosate, the EMFs, stress, bad eating, inflammatory fats, pile it on.

Mackay Rippey: At some point, how can you not be sick? That's really the question. You look at somebody healthy, he's like, "How did you avoid this?"

Wendy Myers: That's what I think too. You're just walking around out in public. You know what kinds of diets people are eating. You know the majority of them are on medications and it's just how are, I mean, if the prognosis is grim for a lot of people given our environment and diets and the medical system?

Mackay Rippey: Well, the numbers show that. For the past two years, our life expectancy has decreased. For the first time, I think, no, there was a brief time in the '30s during the depression where it went down but since they've been measuring it ... Our lives are getting shorter. That's not good. We're going on the wrong ... With all the technology we have and a lot of those old deaths used to be things like the flu or heart attack. People don't die of heart attacks anymore because we can save them but they die of heart disease, right? They have dementia. They have strokes, catastrophic events like that. They're still alive and they died from organ failure but it's not a heart attack anymore. Yay, we're getting better.

Wendy Myers: Yeah, yeah, that's my grandfather died of organ failure but had a heart disease, high blood pressure, metabolic disease, a whole nine yards.

Mackay Rippey: Yes, sorry.

Wendy Myers: Yeah. How big of a problem is environmental toxicity and heart disease? You talked about BPA, which is just ever-present in our environment, BPA-free is not any better at all. You just kind of to avoid plastics as much as you can but even still, it's almost impossible. It's in our water to the water we shower.

Mackay Rippey: It's like rocket fuel, right? Yeah, we've all got it.

Wendy Myers: Into the shower water that you're showering in. Very few people have home water filters. It's just-

Mackay Rippey: If you haven't seen Wendy's last episode with Leo, what's his last name?

Wendy Myers: Oh Leo Szymborski.

Mackay Rippey: Szymborski, yes. Go watch that episode. It's awesome.

Wendy Myers: Yes, it's good. Leo is amazing. He's such a brilliant speaker about water filtration and the importance of that.

Mackay Rippey: Yup. How big a problem of it? Again, this is me out on a limb, I don't know that anybody can correlate the two as closely as we'd like but how can it not be? I just listed all those things, they lead to heart disease and we've got all of them. The best you can do is minimize your exposure and protect yourself as much as you can.

Mackay Rippey: I grew up in DC and the problem in DC when I was growing up was lead exposure from leaded gasoline and also the old paint in houses. Then, the fumes, we lived on Calvert Street on a really busy street and lot of busing and gas exhaust from the cars going by. I got tested. It became a big scare sometime in the late '60s, early '70s. My mom took me down to the hospital and got my blood drawn and sure enough, significant lead exposure. What was the answer? "Well, stop letting him eat lead paint," they said. Well, I can't remember the last time I ate lead paint, not sure what we're going to do. That's just the case.

Mackay Rippey: Our bodies can excrete some. There are pathways where we can get rid of heavy metals. It's just we're overwhelmed. We've done too much. It's too much. We're designed to handle some. It's just not everywhere.

Mackay Rippey: Now, I'm out in the countryside and on one side I've got organic farmers and on the other side we've got non-organic farmers. Luckily, we're kind of up wind but they spray glyphosate and other chemicals. It's own feed

for the cattle. It's not going direct to market but it's out there and it's amazing to see it just like nothing all these fields.

Mackay Rippey: I know I got corrected once, yeah there are some glyphosate-resistant weeds but well this field literally across the street when they spray it, nothing else but the corn grows, nothing. No weeds. No nothing.

Mackay Rippey: Matter of fact, they had been farming that way on the property a little 30-acre farm and for many years, there were no fireflies. There was like all of a sudden, one summer came and there were fireflies and I didn't realize we were missing them. I was like, "Wow. That's amazing," but the fireflies were like the canary in the coal mine.

Mackay Rippey: Neil Nathan has this. We're stealing this from him. Neil Nathan says, "There are people out there who are super sensitive. We call them the canaries in the coal mine." He said, "Don't forget we're all in the coal mine." It's not their problem. He's like, "We're in the coal mine with them, grab them and let's get out."

Wendy Myers: Yeah. Amphibians also, I grew up in Texas, there were just frogs everywhere like hundreds and hundreds of frogs when you'd walk at night and they're just gone. I mean, people have sprayed these pesticides and glyphosate, roundup weed killer and the amphibians were gone to my surprise.

Mackay Rippey: That makes the work you're doing, I think, critical. It may be the most important piece in health. Step number one, stop hitting yourself on the head with the hammer. You got to take away the insults. You got to get rid of the molds as much as you can. We can't be perfect. You can't but we can do better.

Mackay Rippey: Again, our bodies when they're relatively healthy can handle some insult. It's when we get overwhelmed that things fall apart. Follow Wendy's advice, clean up your environment, clean up your livers, clean up yourselves, get saunas, do all the things that you know to do. Get inspired.

Wendy Myers: Yes, exactly. That's I'm trying to do is inspire people. You have to have some reality check. It's a little depressing talking about all of these toxins and everything but there's a lot you can do and a lot you can control. One really interesting thing to biohack your body is genetics and doing genetics testing.

Wendy Myers: I actually listened to a lecture with Donna Gates this weekend and Lead It To Live It conference and she was talking about genetics. You do functional genomics testing. How did you get into that and can you explain exactly what Functional Genomic Nutrition is just what you focused on.

Mackay Rippey: I'm going to plug my podcast.

Wendy Myers: Okay. What is the name of it?

Mackay Rippey: Lyme Ninja Radio.

Wendy Myers: Lyme Ninja.

Mackay Rippey: What happened-

Wendy Myers: Lyme Ninja Radio.

Mackay Rippey: Lyme Ninja, yeah.

Wendy Myers: Yes.

Mackay Rippey: I need to have you on if you wanted to.

Wendy Myers: Yes, I would love to.

Mackay Rippey: What happened was, I got Lyme. I told you my Lyme story and it started showing up in our community and invisibly so and I have a friend who's an expert, Greg Lee in Frederick, Maryland and he'd been chirping in my ear about Lyme disease. I'm like, "Yeah, yeah. Whatever."

Mackay Rippey: Finally, I got inspired. It's like, "Okay, my community needs somebody who knows." I set up a support group in the area, started learning about it. What better way to learn then to start a podcast. I'll learn and I'll share my knowledge with everybody else and we'll just all learn together.

Mackay Rippey: Two hundred sixty three episodes later, five years later, one of those interviews is a man named Bob Miller. Bob Miller is like naturopathic Yoda. He's just this kind of unassuming ... If you saw him in the mall, you wouldn't ... Actually, you wouldn't see him in the mall. You would just walk right by him.

Mackay Rippey: He's very unassuming but he got this beat ... What happened was, he was doing nutritional counseling and methylfolate became exciting the MTHFR genes became excited. People began looking at their 23andMe data do they have the MTHFR. Yes, I've got it.

Mackay Rippey: He started doing that and giving his patients, suggesting they take methylfolate. Some of them did great and some of them did really, really bad. He thought, "There must be something else to the story." That began his investigation and this is probably about 15 years ago.

Mackay Rippey: It goes on and on and he starts looking the other data and doing research and looking at the genes in 23andMe and he puts together this software that was looking at 9,000 different snips within the 23andMe and he created the system and he figured out why methylfolate isn't great for everyone. The reason is methylfolate pushes the phase one detox and if

you have snips or problems in phase two, you are setting yourself up for disaster. Phase one, takes really toxic chemicals. What makes them water-soluble and more dangerous to the body in some ways, they can't be stored anymore. They have to be dealt with and if phase two isn't up to the job, then that just blows up in your face. He said, "You have to get your phase two right before you start pushing phase one with methylation.

Mackay Rippey: He discovers that. He starts teaching other people 23andMe in the middle of the night, changes their test. Instead of looking at these nine thousand data points, they're now looking at about three thousand so basically a software stops working. It's probably done on purpose, I think, I'm a little conspiracy thing.

Wendy Myers: Sure. Well, they were shut down by the FDA for a minute. They had to make them happy and redo the test.

Mackay Rippey: Right. The other thing about this is you go to a genetic counselor, what they're looking at is this gene causes this disease. That's way too simplistic. Again, we're looking at compounding factors here. What 20 factors genomic problems add up and inter react in a certain way that caused certain problems down line and that can lead to, okay, we need to intervene over here to make sense of that.

Mackay Rippey: We all have 20, 40 different problems genetically or more but they're all different. They all line up a little bit differently and that's the fun part. He calls it a 3D chess game played underwater. Long story short, you get the picture, right?

Wendy Myers: Yeah.

Mackay Rippey: It's like that. It truly is like that. He had to develop his own chip. He spent a quarter of a million dollars developing his own chip. Now, we've got a chip that measures 18,000 instead of 9,000. It's much more sophisticated. We're getting deeper into it. There's a whole group of physicians out there, naturopaths, occasionally an acupuncturist like me who's just fascinated by the way that genomics influences nutrition.

Mackay Rippey: What happens is somebody literally you get a kit, you spit in a tube, you send it off just like 23andMe except it goes to a different lab. It goes to a lab in Princeton and they do the analysis. We get the data back. Run reports spend a lot of time analyzing it and figuring out what's going on. It's not simply this snip or this gene causes this problem. It's not you have nitric oxide genes, therefore, you have nitric oxide problems. It's much more sophisticated than that and right now we don't have the machine logic to do it. It takes a human being. I kind of like that actually.

Wendy Myers: Yeah. What genes are involved in nitric oxide function and production?

Mackay Rippey: Yeah, of course, the nitric oxide synthases themselves then there's a cofactor called BH4. BH4 recycles nitric oxide. It's necessary to keep the

enzyme from uncoupling but BH4 interesting is also involved in neurotransmitter formation. We need that to take, for example, trip the tryptophan to serotonin. If you don't have enough BH4, you can't turn tryptophan into serotonin and you become a little bit anxious and immense.

Mackay Rippey: If you're low BH4, you can have nitric oxide problems but you can also have psychological problems or emotional problems as well. BH4 is a big one. We're all hearing now about NADPH, AND, the nicotinamide riboside, I think I got that right, NMR in that pathway. You need those pathways right to get the electron donor there. You need some zinc and then the oxidative snips and the oxidative genes because if there's too much oxidative stress in the cell, then it's going to start breaking down the nitric oxide synthase. Those are the big ones. Those are the big ones. There are other ones involved as well.

Mackay Rippey: It has also the citrulline part of the urea cycle. There's a citrulline conversion to arginine but that's a discussion for another day. There are probably about six major ones and a dozen in total that we look at to see about nitric oxide function.

Mackay Rippey: However, again, 3D chess game played underwater, then you can have nitric oxide problems and have the perfect genes. You could win awards for your perfect nitric oxide genes. However, the functionality has become a problem.

Wendy Myers: Yeah, there are a lot of things that act on our genes like environmental toxins and stress and other things that cause them to express or turn them off.

Mackay Rippey: Exactly.

Wendy Myers: That's why it's a 3D chess game underwater.

Mackay Rippey: Yes.

Wendy Myers: You can learn about your nitric oxide genes, perhaps from there some workarounds around your genes and then what other kind of information can we get, dietary information, do's and don'ts from a Functional Genomic Nutrition testing?

Mackay Rippey: Yes. There are some clues into whether somebody will or won't do well on a genetic, I'm sorry, on a ketogenic-type diet. Some people just need few more carbs. Now, I'm not a fan of peanut M&Ms and Diet Cokes. That was my go-to snack for years and years and years. I hear you used to like Diet Coke as well?

Wendy Myers: Oh my God, yeah. Every meal unfortunately. Not anymore.

Mackay Rippey: I love the [crosstalk 00:53:33].

Wendy Myers: Definitely broke that habit but yeah, it was [crosstalk 00:53:36].

Mackay Rippey: Good for you. I'm healthy except for the pile of Diet Coke bottles in the back.

Wendy Myers: Yeah, I recycled them.

Mackay Rippey: That's right. Power to the people. What were we talking about before we got sidetracked by Diet Coke?

Wendy Myers: The carbs, the [crosstalk 00:53:57].

Mackay Rippey: Carbs, yes. Yeah, some people just need some more carbs because they're not as efficient-sparing carbs or they're not as efficient burning fats. They may have some genetic issues with either digesting the fats or pulling the fats into the cell to be used for fuel.

Mackay Rippey: In that case, you could support that. Maybe those are people who just take a longer time to transition either into like a ketogenic diet or just they need to keep their carbs up a little bit higher. Those are people who maybe need to do 50 grams a day something like that. We get that-

Wendy Myers: Or 150 grams, like in my case.

Mackay Rippey: Really, that high?

Wendy Myers: No, I'm joking. No, but yeah, I like my carbs but yeah.

Mackay Rippey: Who doesn't?

Wendy Myers: Yeah and people have a wide variety of needs for fat, for carbs. I don't like this these one size fits all diets.

Mackay Rippey: I know.

Wendy Myers: All keto or vegan or these extreme diets people get in a trouble. Not everyone has an ability to be on these extreme diets genetically. Your genes can give you clues to what you should do or not do.

Mackay Rippey: Absolutely. One of the big genes we look at are the MTR and MTRR genes and they have to do with how our body uses vitamin B12. For example, if you're a vegan and you've got these genes and you need extra B12, you're in a tough spot to try to get, unless you're getting injections. It's tough to get it even sublingually. Over the years, it's not going to go away immediately. You hear these stories where eventually somebody they smell bacon, they've been a vegan for 20 years and they smell bacon and bacon apparently is the gateway drug for vegans.

Mackay Rippey: Then, they start eating a little bit of protein. They don't go crazy but they add a little bit of protein back in and all of a sudden, they didn't realize how sick they had become over the years, how exhausted they had become and how their health had declined and then they start feeling good again. They're still eating well.

Mackay Rippey: Listen, I totally get why not to eat meat. There's so many reasons not to do that but it's really, really difficult to be fully healthy and to be a full-on vegan.

Wendy Myers: Yeah, I agree. I agree. There are some people for whatever-

Mackay Rippey: That's my personal-

Wendy Myers: There's some people for whatever reason their genetic makeup, they can just handle the inherent nutritional deficiencies, where another person can have severe health issues and nerve damage and their back hasn't and their spine degenerating and all kinds of horrific things that they just need to eat some meat to make those symptoms go away.

Mackay Rippey: Eggs or something, right?

Wendy Myers: Mm-hmm (affirmative).

Mackay Rippey: Spirulina, something.

Wendy Myers: Yes.

Mackay Rippey: To your point about one size does not fit all, my favorite thing I tell my patients, "What should I be eating?" They said, "This diet, that diet," and you get true believers. Somebody tries to diet and it's not for them, they just try the next one and you don't hear much about it. Somebody tries to diet and it saves their life, they are now evangelical about that diet and everybody's got to do it because it saved my life.

Mackay Rippey: You go through Barnes and Noble, one book by one. They're exactly the same format. Their testimonials, diet X, the grapefruit diet, the pork fat diet, the whatever, the celery diet saved my life and these people are sincere. I believe it really did. Then, they've got the science behind it and then they've got the recipes. The books are all the same. It doesn't matter what the content is. It's like the same guy wrote it or they're buying the same template and then filling in the blanks.

Mackay Rippey: It's incredible and that's because we're so genetically diverse. I think we're even more diverse. If you rewind history, generations would grow up in the same place, unless something catastrophic happened.

Mackay Rippey: They did a study through the [Huns 00:58:04] coming through the different areas and they found language changed more than the genetics.

It's like we are rooted to where we're from until we weren't, right? We start traveling to the new world.

Mackay Rippey: In addition to traveling to a new place, now all of a sudden, you got, like in my case, my family, Irish men marrying an Italian woman. What should you be eating? Should you be eating Mediterranean? Should you be eating something like haggis or something weird that the Irish would eat?

Wendy Myers: Like potatoes and whiskey, no.

Mackay Rippey: I like potatoes and whiskey. I just had Tullamore Dew the other day. Anyway, sidetrack. Squirrel has whiskey. The point is, we're even more confused. We've got genetic combinations that are unique and now you put them in America where nobody eats like their ancestors did, like their great-great grandmother did.

Mackay Rippey: Around us, there are a lot of Sicilians. The Sicilians came over about 120 years ago. I'll ask my patients, they're my Italian patients, "Tell me how long your great-grandmother lived?" "Oh, great-grandma Mafalda, she lived until she was 99. She was healthy as a horse." "Tell me about your grandparents?" Well, Josephine, she lived until she was 90." How long do your parents?" "While my parents died from heart disease when they are 95." It's like, the age, it's supposed to be the other way around. It's like they're living shorter lives and why is that? They've abandoned the foods that nourished. They abandoned the ways that worked for them.

Mackay Rippey: Great-great-grandma ate exactly the same as she did. She found American equivalents or ate the same way she did back in the old country and we moved further and further away from that, more into convenience foods. Should an Italian-Irish person be eating Mexican? Who knows? We don't know. We're just sorting that out now.

Mackay Rippey: I think that's one of the big confusions. I'm sure the number one question you get is what should I eat and the answer is we got to figure it out. We don't know. They said, [crosstalk 01:00:13].

Wendy Myers: Yeah, because I thrive on Mexican food.

Mackay Rippey: That's awesome.

Wendy Myers: I was joking. No, I love Mexican food but with some broccoli sprouts on it. Tell us where they can learn more about your work, where they can do Functional Genomic Nutrition testing and all the other things that you offer on your site.

Mackay Rippey: My website is mackayrippey.com and that's my name, M-A-C-K-A-Y M-O-U-S-E, no, that's what my brother said, M-A-C-K-A-Y R-I-P-P-E-Y dot com and I have information there and I'll explain all about the testing. Essentially, this testing has to be done through a licensed practitioner. It's not available like 23andMe. Matter-of-fact 23andMe's health reports now,

they're useful but they're not going to help you drill down into this 3D chess game that we're talking about.

Mackay Rippey: They're going to tell you avoid fats or you should eat more carbs, just simple things like that, which may or may not be correct because actually they're just percentages. You need somebody to walk you through it. It's that complex at this point. Maybe, in 10 years, it'll all be done by a computer but right now we need human beings.

Mackay Rippey: Go to my website. I've got a box there that says Wendy Myers Detox. You click on that. We'll have more information about how to get the testing done. I can help you do that. If you want to work with me, that's great. If not, I can help you find somebody in your area if you want to go face-to-face or you can do, of course, teleconsults.

Wendy Myers: You have your podcast too, Lyme Ninja podcast.

Mackay Rippey: Lyme Ninja Radio.

Wendy Myers: Lyme Ninja Radio.

Mackay Rippey: Yeah. If you know people with Lyme disease, I've gotten some ... I'm sure you get the same thing, these heartfelt letters from people who are so sick, they're bedbound, they're literally suicidal and they find something that gives them a spark of hope. When you've got like you have 300 and something podcast and somebody can just binge listen and get them through the night to a voice they like and to listen to, it's really something. The topic I do is around Lyme disease. It's just an awesome podcast.

Mackay Rippey: People in the community have been so generous with their time and their expertise sharing it. I'm sure you've experienced the same thing. Again, lymeninjaradio.com, same places iTunes, Stitcher, all the places. There's Lyme, excuse me, lymeninjaradio.com as well for our website. You can find everything there.

Wendy Myers: Well, fantastic. Well, Mackay, thank you so much for coming on the show. That was really, really interesting and this is a topic I hadn't explored before but it's a really important part of the conversation. Thanks for coming on.

Wendy Myers: Everyone, thanks for tuning in to the Myers Detox Podcast where every week we explore all types of topics related to detoxification and your health in general. Genetics and nitric oxide definitely are an important part of that conversation. Thanks for tuning in. I'll talk to you guys next week.