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Hi, everyone. Nice to have you all join us. I think I've got this close up view, again, with Facebook Live. In any case, there's been some concerns and discussions over the years with chelation therapy. What I want to do is really talk about what are some of those issues with chelation therapy and what you should know as a patient, how it's evaluated, how it's assessed, and what cost benefit analysis you should do if you're concerned about chemical overload, how to evaluate it, how to measure it, and how to determine what the right strategy is.

The basic model, if you're not familiar with chelation therapy, it's really involved with trying to get rid of heavy metal or toxic load. When you look at how the body works, chemicals have the ability to load in our body, and there's different types of chemicals. There are chemicals that... We can break down chemicals into two types. Some chemicals that cannot be cleared out through our own clearance pathways, primarily the liver, they call that biotransformation. Normally, when we get exposed to chemicals, things like, let's say, bisphenol A, from plastic products or fire retardants from furniture, various different types of chemicals... using laundromat soaps and chemicals that are used for cleaning agents.

We're getting exposed to chemicals all the time. There are a group of chemicals that our body has the ability to eliminate with just our biotransformation pathways. Those are not a major concern for us, other than we'd have to have a healthy nutritional status to support biotransformation. Now, the conversion of these chemicals from our body through biotransformation takes primarily in the liver, but also in the gut. The microbiome has bacteria that also are involved with biotransformation just like the liver.

The goal of this clearance of chemicals is called what's called phase one and phase two pathway. For the most part, there's different names for this biotransformation pathway. You can have something called methylation, when they add what's called a methyl group, that's where B-12, folic acid's really critical for them. Sulfation is another critical pathway to clear out chemicals and toxin from our body and even hormones. Sulfation requires sulfur amino acids, so diets really high in sulfur and glutathione and different types of sulfur based vegetables really provide substrates for sulfation. Acetylation is a two carbon clearance pathway that requires lots of, again, B-12, folate, B vitamins. Glucuronidation is another pathway. Glucuronidation really requires us to have a steady supply of blood glucose to then help make this things called glucuronic acid to help us clear out different toxins.

When you look at our biotransformation pathways, there are substrates we need from a nutritional diet point of view that really help us clear out toxins and chemicals.

Antioxidants play a significant role in the first phase one pathway of this reaction. In an ideal scenario, when we get exposed to chemicals, we have our liver, which has these biotransformation pathways to clear out chemicals in the gut, and we have diverse

bacteria, we have lots of different bacteria. Some of these bacteria in our microbiome help with sulfation, some help with acetylation, and then we clear out these normal toxic compounds. Those are for chemicals that our body can clear out.

Now, there are certain chemicals our body cannot metabolize out through biotransformation, and those are, for example, heavy metals. Things like mercury, things like lead, things like arsenic, and the reason that these are such of a concern for us and really classified as toxic chemicals is because they're chemicals that our body cannot clear out for us. There are chemicals that are unhealthy for us like benzene from cigarette smoke, and chemicals like benzene we can't clear out, and it can increase our risk for various health conditions. And then there are certain chemicals that can really cause significant and serious disease like lead and mercury, because their build-up then creates what are called free radicals. Those free radicals start to destroy tissue and they've been linked with all types of diseases in the peer review literature, things such as neurodegenerative diseases, things like learning disorders, we know lots of studies have shown children exposed to lead during early development have significant brain developmental issues. We know that toxic metals are a concern.

Now, where chelation comes into this big picture is that chelation therapy is when someone takes some type of agent, whether it's oral or it's an IV, to bind to chemicals that our body cannot clear out through the liver and gut, these so called biotransformation pathways. Those most common chelators that are used that are by prescription are something called DMSA, DMPS, and EDTA. EDTA was the initial chelator, then they went to DMSA, and then they started to move more towards DMPS. One of the concerns with chelators are... is that...

The way chelators work, by the way, before I get into that. The way chelators work is they bind to that ionic charge of the chemical, which then allows the binding of these chelating agents to it to then be able to be cleared out of the body through our gut and liver and urinary pathways and fecal pathways and so forth. The goal of the chelator is to get toxic chemical like lead or arsenic and mercury, have something attach to it or bind to it, and that'll help with chelation. This chelating process of binding to heavy metals with a chelating agent can take place in the cell, they call that intracellular, or outside the cell, extracellular, and three of the chelating agents have been shown to have some degree effect.

Now, the fact that they can remove chemical agents within our cells, they also have the potential to induce what's called, redistribution. For example, you go on a chelating agent and the heavy metals you're trying to clear out, some come out, but also some of them get pushed into other tissues. In the toxicology literature, one of the concerns with chelation therapy is this model of redistribution. The redistribution models have only been done on animals studies, because they have to actually sacrifice the study animal to see if when they went under chelation that those toxic compounds actually ended up into different tissues and in their organ systems compared to those that didn't have those chelating agents. We know that in animals research, which is the only way you can do it, there's no way you can have a human decide to be in a study where they are

going to go on chelation and then have biopsies of their tissues, like their brain and their organs and their bone and their tissues determined if it's redistributed into actual tissue, not what's in the blood.

The purpose of chelation is to clear out these heavy metals, but the chance is that it can redistribute to these other tissues. Now, the question has become, okay, so what do you do? Well, for example, if you're stuck with having high amounts of lead or arsenic or mercury, there's definitely some clear indications that that's not a good thing and that can increase your environmental and toxic load. If it increases your environmental and toxic load, that can be a contributing factor to, let's say, a chronic condition. Some of those have already been reported in literature.

Let me just try to fix my camera. This Facebook camera is so weird. It just keeps doing its own thing. Every time I log in, sometimes it's fine, other times it has me focused in and there's no features I can change when I log in and I don't know what's going to happen until I do it. So excuse me, if you're getting a total close-up. That's not my intention.

Anyways, when you're looking at chelation and how you deal with it, it's going to depend on what kind of practitioner you see, and there's different biases with different healthcare practitioner, and there's different people that don't understand the differences. Let me explain what I mean. You'll go and see one practitioner, and they'll say, "Oh, you don't need to worry. You can get rid of heavy metals with chlorella or you can take zeolite or you can take some natural substance and that'll get rid of everything," which is not necessarily accurate. Or someone else is saying, "Well, chelation it's safe. It's been used forever. It's no problems with it. So, yeah, you should have no issues, and don't worry about it. It's more important to get these metals out." And then you can have another opinion where, "No, you really have to be concerned with chelation." These different biases that are out there with different practitioners based on each practitioners own biases and how they think of a condition and how they look at things.

All I can do with you is share with you what I know and give you my biases, and tell you what the pros and cons are for each way of looking at this, because as a practitioner who works with a lot of chronic disease and works with a lot of patients with neurological disorders and works with a lot of patient's autoimmunity, it's really important to take a very thorough evaluation of how chemicals and toxic compounds may be impacting their health and physiology and how to address that in the proper way to reduce the risk and give them the best benefit.

I will say there is... When I've looked at this, I think there's a place for it and there's a place where it should not be used, and that's the ultimate question. Now, before we get into should you use chelation or not use chelation, just realize, as a review, some chemicals we can clear without chelation. These are chemicals that can be metabolized by your liver and by your microbiome into end products that we can excrete out of our system. Those are called biotransformable chemicals. And then there's chemicals that

cannot be biotransformed, and those are typically things like heavy metals, and that's where the chelation argument comes in, and they're two separate things.

If you go on a nutritional, botanical detox, you may be able to get rid of the biotransformable chemicals, but you may not be able to get rid of the heavy metals. That's the key thing. The natural things like chlorella and even zeolite, they're not very effective chelating agents compared to DMPS, DMSA, EDTA for actual levels of high amounts of lead in the body or mercury and so forth.

Now, in order to realize what the appropriate approach is, the first place to really start is... Let me see if I can get my camera... is what chemicals... how the chemicals are being assessed. You can measure the load of a chemical, and let's just stick with heavy metals like lead, mercury, arsenic, not the biotransformable ones, but the one where chelation may be an important thing to consider. You can measure chemicals in blood, you can do a blood test. You can measure chemicals with what's called a challenge test, where they do a baseline urinalysis, and by the way, you can measure chemicals in urine, and then with the challenge test, what they do is they measure baseline levels of urinary toxic chemicals, and then they put a person on a challenge and the challenge is a chelator, something like DMPS. Once they get on DMPS or DMSA, depending on the practitioner they're seeing with, they'll do a post-test after the chelating agents, and they'll see if there's an increased level. If there's an increased level, then they're considered to have a lot of toxic chemicals. That's the challenge test.

You can do a baseline urine test, you can do a urine test with a challenge chelator, called a challenge test, you can measure them in blood, there's also hair analysis, but hair analysis tends to highly varied from one lab to the next. It's considered the least accurate type of testing for heavy metals and for the most part, I think, I think there's better options than hair or tissue. You can measure heavy metals in a toe nail, you can measure heavy metals in hair, but they reproducibility and reliability of it, it's not as good as the other ones. The most common ones that are used are the challenge test, with people that do chelation therapy and then with typical... with your average general physician, if they're worried about toxicology, they will just measure blood levels of, let's say, lead or mercury and see if there's an overload. That's what you typically see happen in the healthcare arena.

Now, let's talk about the chelation challenge test. First of all, every single human being on this planet, that is going to do a chelation challenge test is going to show up with high amounts of chemicals, because the chelating agent's going to pull them out from their tissue and all of us have some degree of lead, mercury, arsenic just from the soil, just from the food we consume. We don't always know how to find the source of where these chemicals are coming from because they're ubiquitous, they're everywhere, they're in our food chain, they're in our food supply, they're in our vegetables. That's just the way it is. They're in our water supply, to some level, and over time, these things can build up. It's been that way since the beginning of time. If you look at anthropological studies with human beings, we've always had some type of chemical load, and our body can function with some degree of chemical load. The point is, when does the body lose

the ability to respond and react and to not have this load cause health problems? Then if it does, what do you do about it?

When it comes to testing, I would say, how you get testing is going to, again, dependent on who you see. If you walk into a conventional healthcare model and feel like you may have had some exposure to a toxic chemical, let's say mercury, they're going to measure a mercury blood test, and you may not have levels that are high. Then if you go to the chelation experts, they're going to do a chelation challenge test, and for sure, you're going to have high levels. That's one of the things you should know, the minute you walk in to get a chelation challenge test, you should know, you're going to have higher levels.

The problem we have is that we have these people that are chelators, I call them heavy metalers, that kind of blame everything that's possible, any health problem that's there to heavy metals. They check the patient out, they find toxic chemicals with the challenge test, and then they assume that that is the problem for all their health problems. They get a treatment protocol, maybe, 10 sessions, 15 sessions, maybe somewhere between a 100 to \$300 a session, or even more, and then they're spending several thousand dollars to go through this chelation therapy model. But the assumption that that's the cause of all their illnesses is an issue, and the other concern is not everyone can actually handle chelation therapy, and some people are having potential risk redistribution of these chemicals, especially if they have permeable blood-brain barrier.

Staying on the topic of testing, how you get tested and where you go for testing and the bias and the benefits of each of these tests is going to give you a clue. Now, blood testing for heavy metals is going to be a reflection of how much recent exposure of, let's say, mercury or lead or arsenic had, and by recent, meaning in the past week, past few days. If you got exposed to a high amount of it, it may even be longer than a few weeks or a month, and eventually, those toxic chemicals are going to push into your tissues, especially, body fat and especially bone, and then they'll not show up serum anymore, but they'll be distributed in your tissue over time. Chemicals have an ionic bond to your tissue, so they'll redistribute into your tissue. This is also why, for example, when a lot of women reach menopause and they start losing bone density, their arsenic levels go up like crazy, and their lead levels go up like crazy, because as they lose bone in osteopetrosis, levels of lead and arsenic go up, because they're being released from the bone lose. They were normally stored in that bone tissue.

When you're looking at blood testing, you're really measuring that window of time where there's been a chemical exposure but it has not been redistributed and pushed into tissue yet. This is why a lot of people will not have serum levels that show an issue, but will clearly show a pattern when they do a chelation challenge test, where they actually take a chelator to push this stuff out of their tissues and into their urine. Those are the key things to think about when you're doing laboratory testing. There's also another mechanism of measuring chemicals, which is totally different, which is looking at chemical antibodies. You can have antibodies to mercury. Mercury and lead and arsenic and these heavy metals can actually bind to these proteins in your own body.

One of the most common one is albumin, which is the most abundant protein in your blood. When mercury or lead binds to albumin in your blood, it then creates a new protein, a new antigen, and then the immune system makes antibodies against them.

These antibodies can be measured with a blood test, so labs can measure chemical antibodies, and that's an immune response against the chemical, and that's different than recent exposure. The best way to think about testing is I would say, you can use hair but it's unreliable and not useful from a lab to lab, it's not really worth doing. You have urinalysis, which measure how much you're clearing out in a recent window. You can do a challenge test with urinalysis, meaning they measure urine levels of heavy metals, and that's called the chelation challenge test. Most people, almost everyone is going to show positive with that, so that's measuring how the chelating agents are actually pushing chemicals out of your body, and you would expect those to go up with the challenge test. And then, you can measure blood levels, which measures acute exposure. That's the first thing you need to understand, how, if you're looking at toxic metal load, you have been evaluated, and what those factors are.

It's pretty much guaranteed, if you walk into a chelation therapy center, you're going to get diagnosed with heavy metal toxicity and need to do chelation, it's pretty much 100%, 90% let's say. Now, one of the issues we have, one of the things that I've seen in practice over 20 plus years, is that there are people who actually get really, really sick when they do chelation therapy. Despite the fact that heavy metals and chemicals are bad for us, pulling them out of the tissue and even more concerning, redistributing them in vulnerable tissue can be a problem. There has to be some degree of health that a person should have before they immediately just try to consider doing chelation therapy. Theoretically, we all want to reduce our toxic load, it would be a good idea for all of us to have a healthy liver and microbiome, biotransformation pathways to get rid of a group of chemicals, and ideally, it'd be nice for us to pull metals out of our tissues with chelation, but the only problem with that is that it can redistribute.

That's why it's not for everyone, because there's always that risk factor, and that risk factor has been published. [inaudible 00:19:18] that's just in animals, you have to immediately know that that person telling you it's only an animal study, is that they have no idea how research works. Because there's some clinical study questions you can't do in humans, because of ethics review boards. Of course, redistribution's only going to be in animal studies, so if they're citing it that it's only an animal study, that's not the same in humans, they basically don't understand the concept of creating a proper research model for a question you have and the ethics involved with that. There's actually some ethic views issues with using redistribution in animals, but they've been done.

In any case, my concern with chelation therapy with patients that I consult with and work with is, are they healthy enough? If someone has a breached blood-brain barrier and they have blood-brain barrier permeability, they have intestinal permeability, they autoimmunity, they're chronically inflamed, they have high amounts of oxidative stress, they don't have a healthy antioxidant system add a chelating agent to their system to

pull out chemicals and potentially redistributing those toxic compounds to the other vulnerable tissues, can be a problem. This is not uncommon. If you're a healthcare professional, I'm sure you have heard patient after patient, some saying, "Yeah, I went through chelation therapy, and I couldn't tolerate it. I totally fell apart. I got worse," or "my autoimmunity got much worse after that" or "after three sessions I started having new neurological symptoms that took place." Those are some of the concerns.

Now, at the same time, there could be a time and place where you may want to get rid of chemicals as quickly as possible, so it doesn't store in your tissue. For me, if I ever saw someone that had high levels of blood lead, mercury that means they're having those toxic chemicals in their blood and it hasn't distributed to into their tissue as well, yet. If the person didn't have any health issues or blood-brain barrier permeability or any of those things, then you can definitely consider doing DMPS, EDTA, and EDTA, that's going to be for myself for example, because I know it's going to very quickly and effectively bind to those toxic compounds before it gets a chance to distribute to my tissue. That's the most effective way to get rid of those as soon as possible.

But if I had a recent head trauma, had blood-brain permeability, had some kind of severe flair up of an autoimmune disease, I'd be very hesitant to do that, and I may just switch to [inaudible 00:21:49] where I have high levels of toxic compounds in my body, just using something like IV glutathione, intravenous glutathione. Intravenous glutathione does several great things. First of all, it has binding properties, it's not as powerful as a chelator, as DMPS, DMSA, and EDTA, but it does have some chelation properties, and glutathione also helps to heal the blood-brain barrier, it helps heal the gut barrier, so it decreases the risk of vulnerable tissues to get redistribution. Some people have chemical immune reactivity to chemicals, where they have these high antibodies, and glutathione helps support regulatory T cells. If a patient's vulnerable or a person's vulnerable, it may be a better idea to use IV glutathione than IV chelation.

What about natural, oral glutathione or supplements, things like N-acetylcysteine to raise glutathione, those are probably a good idea too in combination, but the load you'll get with glutathione won't be nearly as much as an IV, IV therapy, but you can use oral compounds. And probably the best way to raise glutathione naturally is with simple N-acetylcysteine itself. If you can get access to trizomal, liposomal glutathione. Liposomal glutathione's a very good way, I would say better than N-acetylcysteine to raise glutathione levels. A really safe way to do it with normal people is to have them do IV glutathione if that's accessible to them and that's something they can do with a practitioner in their area, and then also take things like liposomal glutathione take things like N-acetylcysteine. You can also take things like vitamin C and selenium and other substrates to help raise glutathione.

By the way, we have a lot of articles that discuss these types of strategies and this concept at Dr. K News, which is my main website, where I share all my goals and information, so if you haven't checked out Dr. K News, D-R-K-N-E-W-S.com, please check that out. And we have some other talks on various talks like biotransformation,

raising glutathione in our YouTube page. And if you're following our talks on Facebook, you'll always get links to our talks, so please follow us as well.

But any case, there's some more information about glutathione in some of the resources that we've already made, so I don't want to get into that, but NAC, glutathione, liposomal glutathione good ways to raise your glutathione levels. And that may be something you do first, even for a period of time, even if you are considering chelation therapy. Now, an ideal scenario would be to measure blood-brain barrier permeability, measure intestinal permeability, measure chemical antibodies, and make sure that those are all normal, before you jump into DMPS, EDTA. Blood-brain barrier antibodies can be measured with like S100B, Cyrex Labs also measures... they have a panel called Array number 20, which measures the blood-brain barrier antibodies, they also Cyrex Array 2, which measure intestinal barrier permeability, and they have a panel called Cyrex Array 11, which measures chemical antibodies. I have a relationship with Cyrex. I work with them, I consult with them, so they I do have a bias, I think they're a fantastic lab, and they've really done a great job to really develop these profiles that can help look at some of these questions, and other labs have the various testing as well. In my office, I use Cyrex, because it's who I work with.

That's how I would normally, in my practice, check. I would check to see if they have blood-brain barrier permeability, intestinal permeability, do they have any chemical immune reactivity, and if they do, then I'd be very concerned having them jump into chelation therapy. If those things get resolved, if they can heal their blood-brain barrier, heal their gut barrier, they're not reacting to chemicals, because their immune system is healthier... And they way you get your immune system to not react to chemicals is to improve what's called the immune tolerance. We've had a talk on immune tolerance in the past, it's in our YouTube library, and I have some articles on immune tolerance at Dr. K News, we even have an online program that teaches you how to use diet, nutrition, and lifestyle to improve your immune tolerance, and that might be important to do if the person is having chemical antibody reactions.

If they get to the point where the blood-brain barrier's intact, their leaky gut is not an issue, the intestinal barrier's intact, they don't have any chemical antibodies, then I think if they wanted to consider doing chelation therapy, they would be in a situation that's safe. It would still be a good idea to raise glutathione levels and do some strategies to change that before you start, but it's going to be based on what the practitioner and the patient decide to do and there's going to be some uniqueness in that. That would be the key thing I really want to point out with that.

So the big picture, when you're looking at heavy metals and you're looking at this toxicity load to the key principles to understand, and I'm going to repeat these and then I'll jump into questions here, is how is the chemical being tested? Blood is just going to measure acute levels of recent exposure, at some point those will store in body tissue, and then they won't show up in blood, so whenever you see blood, you know you have an acute exposure. Urine is going measure acute exposure. A challenge test is going to push chemicals out of your tissues, which are going to reflect on the challenge test. If

chelation therapy is recommended, you really want to make sure that the blood-brain barrier is intact, the gut barrier's intact, regulatory T cells work, and [inaudible 00:27:11] is there, just doing chelation in a very vulnerable patient may be a very bad idea. Those are the key principles I can try to share with you in a Facebook setting like this. My wonderful wife Dr. Reyes is here.

Hi.

And-

[crosstalk 00:27:26] with your camera.

I know sorry. It's driving me crazy.

Did you hear me yelling, "What's up with your camera?"

I see my skin pores and what can I do? I can't-

No, it looks fine.

... keep moving back, because then I don't have my mic.

I know. Just stop touching it, it's perfect. It's totally perfect.

Anyways.

[crosstalk 00:27:43].

Okay. If there's any questions... By the way, thank you all for joining us, and thanks for everyone letting us know you're here. It's so cool to see people from different countries, and... Anyways, thank you. All right.

Okay, you ready?

Yes. Let's go through questions.

Okay, first from Linda, her husband has Hashimoto's, he was chelated for high lead, and now he has restless leg, is there anything you can suggest for her? He's just in, I think, not in great shape.

Great. I would like to say a few things first. First of all, I really don't think people that are chelating have any bad intentions in any way. I think most people that are chelating are trying to do the best thing. The research on redistribution and chemicals is still light. There's only about 10 papers on it, so it's not really a medical malpractice issue, it's just if you're working with really vulnerable people, there are some concerns that these things may take place, since some early studies showing that these redistribution mechanism can be a factor. If there's a practitioner working with really vulnerable and chronic patients, you really want to take some of this research really seriously, because

when you work with really chronic and sick patients, there's no room for them to have further oxidative stress and add some further health issues.

To make it very clear, I think every doctor that's doing chelation therapy that I've ever met and experienced a talking to, they just don't understand some of this early research, and for the most part, they really think that it's helping patients, and for some patients it really is. If they can reduce their chemical load and they have acute exposure and they can get those out, it can have a positive impact. Chelation therapy is not all bad, it has a role, but it also has the effect of redistribution. We don't really know if the chelation therapy was a factor, so any possible scenario if a patient, a clinical scenario, and these are all theoretical, we can't really know if ones there or not. One possibility is that the person, your husband had Hashimoto's now it's restless leg is that Hashimoto's in matriculation, the blood-brain barrier was breached, some of those chemicals entered the basal ganglia, and there's an area of the basal ganglia that has a homuncular distribution with the feet. It's in the super parietal lobe area, and that super parietal lobe area has homunculus with areas of the basal ganglia, and if that area is gets injured, you can get things like restless leg. That's theoretical model. That really hasn't been proven or shown. It's theory that that can happen.

Another common mechanism can be unrelated to chelation itself is a lot of people that have Hashimoto's have GAD65 antibodies, and GAD65 antibodies bind to glutamic acid decarboxylase, which is also in the basal ganglia area that when injured can cause things like restless leg syndrome or some kind of movement disorder. There's also the possibility that it had nothing to do with chelation. The most common cause of restless leg syndrome in adults, is actually getting a small little silent stroke, a little vascular infarct. The blood vessels that supply the basal ganglia there involves restless leg are very tiny and they're very vulnerable to hypertension and some spikes, so it could be it was a timeline, that was going to happen from high blood pressure or those things anyways. Those are all the different variables. You really can't deduce that the chelation therapy caused that, however, since there is some redistribution... that's the whole principle of making sure the blood-brain barrier is intact, their immune system is healthy, and everything's intact before they jump into chelation therapy.

For example, if I'm working with diet, nutrition, and lifestyle, trying to help a patient with autoimmune disease get healthier, I would really want to make sure they have some degree of health and management of their autoimmunity and remission before they even consider kind of therapy, it would never be the first thing that I would do. That's just a personal clinical experience perspective, but it's not like that's the way it should be done. There's no standard medicine protocol for how chelation therapy should be used or to be used and so forth. I think that's where the level of frustration is, so I don't think you'll even really know what happened, but there's multiple mechanisms that are there, and some have nothing to do with chelation.

Anything can be done?

Sorry.

Well, you really want to make sure, first of all, your husband doesn't have hypertension, if it's controlled, and if they have hypertension, and it's not being managed properly, you should get a brain scan and see if there's any microvascular disease, because little time infarcts can cause that stroke, and at that point the goal is to really make sure the next little tiny stroke doesn't happen. The key things with basal ganglia... And then there's different therapeutic strategies to potentially help with restless leg that may or may not work, depending on how the brain responds or not responds to therapy. You may do complex moves with the leg over and over again like spelling the alphabet out over and over again over time, that starts to redistribute blood flow to the other regions of the brain. For the most part, most of the people who have restless leg are unresponsive to diet, nutrition, and lifestyle, and even neurological rehabilitation therapies. I would still consider an approach working with practitioners.

The problem is that it's not going to be one single variable. It's not like you just have low iron, now, you can take iron. There's a study with people who have low iron have higher rates of restless leg syndrome, but clinically, you never see anyone take iron helps when the restless leg is gone, it's pretty rare that happens. I don't have a really good answer for you other than you need a really good personalized lifestyle approach to optimize brain function and vascular health and autoimmunity to just go from there.

Okay, thank you. Susan's asking, "Okay, so the million dollar question is, what do you do when your blood-brain barrier is breached, you have loss of tolerance, loss of autoimmunities, and super high lead levels?"

Exactly. That's a real clinical scenario.

Yeah.

So what do you do? You would do IV glutathione, you would do N-acetylcysteine, you would take liposomal glutathione, you would continue to try to dampen your autoimmunity, and remember glutathione has some chelating abilities and properties as well. If you're going to try chelation and at some point you get your inflammation immunity working well, you would start with a very, very low dose, make sure you don't have any adverse reactions, make sure your blood-brain barrier antibodies are normal, make sure your chemical immune antibodies are normal and go from there. You can get some chelation effects by raising your glutathione levels. You can even use things like...

You can also optimize your biotransformation pathways and increase your antioxidant load. Some people have lots of chemicals and no clinical symptoms because their antioxidant load is greater than their prooxidant load, so they have much, much more antioxidants. If someone is eating lots of super foods like acai and berries and avocados and healthy foods every day and is not eating lots of fried food and oxidative stress foods and processed foods and then taking lots of dietary, let's say, supplements, in a theoretical model like that, their antioxidant load pretty much more than their oxidative chemical load, so they don't have any significant reactions to that toxic chemical load. That's what you would have to probably do, increase your antioxidants, improve your

immune tolerance, make sure blood-brain barrier and leaky gut are as healthy as possible, then go from there. If you were really concerned with an acute recent level overload, that's when you have to do your cost benefit analysis of whether you want to do some oral chelation to get rid of some acute lead levels.

When you say lead, I mean by blood. Lead in a challenge test isn't going to show up with most people that test, but you had actual acute levels of lead, that would be worth blood testing. That's when you would really consider jumping to some chelating agents sooner than later.

Okay. This is a general question, if heavy metal toxicity is suspect in a patient, what are the best lab tests to confirm it? You've already said it but just [cross talk 00:35:54]-

Look, if you suspect heavy metal toxicity, you can use blood to determine if it's recent, you can also use urine to determine if it's recent, they're both going to show up with recent exposures. Certain chemicals can only be measured... Certain chemicals are in blood, you can't measure every chemical in blood, you can measure more in urine, so that's why some people like to measure urine and blood together. You can measure chemical antibodies to see if there's an immune reaction to chemicals, which is a whole different issue. That means the chemicals are actually triggering the immune response, which is [inaudible 00:36:28] for autoimmunity. And then you can also do a challenge test to get an idea of the total load when you get a chelator. They're all telling you different things, so in theory you can do all of them and see what's going on. For some patients, that may be what they need to do. For patients, they... To be quite honest, it's going to real depend on the bias of the practitioners you work with and who see, that will be probably give you that answer.

For me personally, I like to give those options to a patient. In my office, I tend to like to measure chemical... I work with a lot of autoimmune disease patients, so I like to look at chemical antibodies more than anything else, because if they're high, then I know it's triggering their immune response. And then for me to even consider referring them out, because it's not within my scope to do chelation therapy, for me to refer them out to buddies of mine to do chelation or people I respect that are good at doing chelation therapy, I would like to have them have a healthy blood-brain barrier and I'd be really concerned if their blood levels of mercury, lead, or arsenic were high.

Okay.

Listen, I don't have the best answers, what you'll have to, I think, understand when you understand these concepts, is it's not a flowchart, it's kind of more of a risk/benefit analysis, and there is some risk of distribution, oxidative stress when you chelate, and there's people that have more risk than others and there should be benefits when you pull these chemicals out, but not at the expense of redistribution and firing up a condition. It's not a golden rule. Every patient has to consider their risk/benefit analysis and determine what the best choice is and maybe knowing that there was even a

risk/benefit analysis you are very careful about how you respond and you go into this slowly and when you're healthy.

Okay. Sorry, this is a great one. Oh, Gita's asking, "Are there any signs or symptoms of a patient who have chemical overload without testing?" What would you look for rather than [crosstalk 00:38:34]-

Right.

... actually testing? What you might think of?

Chemical toxicity, acute chemical toxicity is basically a person who all of a sudden loses function. They had an exposure, they've never been the same, immediately after that exposure, and that's an acute chemical toxicity. They get tired, they can't think, they can't focus, they basically lose all function and they just shutdown. Part of the reason is acute chemical loads increase oxidative stress or this prooxidants. These prooxidants that destroy tissues really shutdown the cell's mitochondria, so there's decrease ability to make ATP energy in your cells. The acute chemical load will do that to mitochondria, and in the brain, it makes the brain not work, so they can't think, they can't focus, they can't concentrate, they can't motivate. It does that to their muscles, they can't move. Whenever you see a timeline of someone all of a sudden crashing and there's some exposure, that's when you start to think there's some kind of acute toxic load.

And sometimes it's not just like they walked into a place and mercury fell all over their body or something like that. It could be they started to work in a new environment and over the next three weeks they just slowly decline, so in a three week, less than a year window, it's still part of that acute recent model. Forget about chronic and slowly built up toxic load, they're going to be really hard to identify, because we all have some degree of built up, no matter what, but, again, it's our degree of toxic build up versus our antioxidant and our immune mechanism that determine whether we have symptoms or not. But typically, what happens in a healthcare system, even if it's someone who has never been diagnosed with neurological disease or if it's someone who's been diagnosed with autoimmune disease or just chronic fatigue syndrome, there's a group of practitioners that immediately just think that's heavy metal toxicity, and that can be so many other things. The problem with them is they walked into a place that just says, the challenge test, and they go, "Well, here we are, we're right again."

And then when you look at all the people that actually get chelation therapy, how did it go? It was life changing, it does happen, but it's not as great as you would think. Again, it's important therapy for some people and it has an impact on them that's significant, but for some people it really isn't the right approach.

Okay. Debra's asking, "I've read that glutathione can chelate metals and cause redistribution, what are your thoughts on that?"

There are actually some studies that looked at chemical redistribution of glutathione and they found that it does not do that. In order for glutathione to be able to redistribute it has to be able to pull metals intracellularly, within the cell. One of the disadvantages of glutathione, is that it can't pull heavy metals and compounds from your tissue, it does not have an intracellular effect, it only has an extracellular effect. It can only take stuff that's already in your serum or blood, and because of that it doesn't seem to have the ability redistribute. What makes DMSA, DMPS, and EDTA different is it has the ability to pull compounds from your actual cells, intracellular effect, and that's what allows it to redistribute, so that's why there's... It's more effective in actually getting rid of your load, but there also that [inaudible 00:41:34] for redistribution. Glutathione only seems to be having an extracellular effect and no redistribution.

Okay. Is there a connection between mercury and Parkinson's? Is chelation okay for Parkinson's disease?

Well, here's the thing, so every heavy metal is linked to Parkinson's disease, Alzheimer's disease, just so you know. If you look at the literature, you're going to find mercury, lead, arsenic, cadmium, aluminum, everything. Those things are clearly there, and even things like manganese... There's the problem manganese, there's manganese two plus oxide, manganese eight plus oxide, the one they're using on industrial studies on Parkinson's is industrial oxidized manganese, not the supplemental middle manganese, so people understand the difference between... people sometimes they question, whether they should be taking manganese supplements of things like that. As far as Parkinson's goes, Parkinson's disease is a disease where protein build-up, [colophus nuclein 00:42:40] gets built, but then creates a group of dead cells around it called Lewy bodies, and that gets in the way of how neurons transmit information, and that slowly leads to degeneration.

Mercury can increase oxidative stress, which promotes all that, but you're not going to remove mercury and reverse Parkinson's disease, that'll never happen, so be aware of that. If you have a Parkinson's patient they can be very, very vulnerable with heavy metal chelating substances. Meaning if the blood-brain barrier already breached, they already have some immune tolerance issues, it can speed it up, it can progress it, so, again, cost benefit ratio. To be quite honest with you, at the end of the day... In my practice what I try to share with people is I just try to educate them about all these different variables, and let them think and decide what they want to do for themselves, because it ultimately is the patients decision to know what to do, but they should have informed consent, they should know all the different variables and factors that there for them. For some patients, they chose that they have no degenerated disease and they feel like have a gut feeling, they really should do chelation and get some of this out, then they go for it. For a lot of people they are conscious of it, they do one session, they immediately don't feel any benefits, some may be feel even worse, then they stop. The fact that they have conscious of it though does help.

Karen, "What are your thoughts on sauna?"

Sauna [crosstalk 00:44:13], it means... When you look at how chemicals... Remember, there's chemicals that can be biotransformed and chemicals they can't be biotransformed. All your chemicals that come into your body that your liver can metabolize in end products that can eliminate through feces or your sweat, theoretically, one of the steps of getting rid chemicals is once they're biotransformed into a water soluble compounds, you eventually sweat it out and you urinate it out. There's some potential that saunas can help with that part of it, where you're increasing your elimination of the water soluble compound, but, also, sauna changes you vascular dynamics and your blood flow and gets circulation going and those can help with the clearance of chemical compounds, but they can only work if your liver is actually converting them to water soluble compounds.

If your liver doesn't have the ability to or your microbiome is unhealthy and let's say your liver is just loaded with lots of chemicals and medications, and you don't have antioxidant and your substrates for sulfation, methylation, acetylation are terrible, you may do sauna, but the sauna can't convert [inaudible 00:45:25] compounds to water soluble compounds, it just helps circulation and blood flow. It has a role to play, but it doesn't substitute for what the liver and microbiome have to do with biotransformation. Once a chelating agent binds to a heavy metal, you still will eliminate some of it through urine, sweat, and feces, so it can help with that part of it, but the sauna itself is not going to pull our mercury or lead, it can only pull out once it's bind to a compound that changes the ionic structure of it, so it can be eliminated.

Okay, Joanne's asking, "Great Plains Lab use urine markers tests for long-term exposure like for glyphosates, do you use those?" [crosstalk 00:45:59]-

Yeah. Great Plains has a great test, you can use a Great Plains test for glyphosates. They also have pesticide chemical urinary profile and can measure recent exposures in your body, so it's a great way to measure it through urinalysis.

Okay. Laura's, "What is your perspective on EDTA chelation for atherosclerosis? Effectiveness, safety issues?"

Right, not many people are using chelators for that, they're using chelating agents to bind to calcium deposits and to clear those out of their system. I don't know if there's a lot of evidence that really supports that, and I can only tell you I don't have the experience to answer that question very well, because I don't do pre and post-imaging studies to look at calcium channel scores and see if that helps. And there isn't much research... If there's research out there, I haven't read it, so I can't do a good job answering that, because I don't work... That's not a big part of my clinical experience, so I can say, I don't know.

Okay. "Can someone leak heavy metals while on a diet to lose weight?" Selene's asking.

Sure. The main tissues that store toxic chemicals, chemicals you can biotransformation and chemicals you can't biotransformation is body fat and bone. There's an entire field

of research in the field of toxicology where they study what are called obesogens. Obesogens are chemicals that store body fat, and one of the theories in the obesogen model is that when you get involved with an increased chemical load, it shifts your body into actually increasing your body fat. Some chemicals, the most studied one for example is bisphenol-A, BPA. High amounts of plastic products are considered obesogens, and in animals studies, they can feed them BPA and feed a group of mice BPA and group of fat BPA and then mice that get BPA, get fatter with the same caloric intake. And other chemicals have been studied that way and they're called obesogens, O-B-E-S-O-G-E-N-S.

What they've also found is that if they do get exposed to chemicals and they are able to increase their fat, they don't have the oxidative stress and inflammation, that it's actually protective for them, so even though it may make them fatter, that the ability to store heavy metals in their body fat is actually protective. They've also found when body fat or bone is lost like in osteoporosis or weight loss, these chemical compounds then, are now redistributed in tissues, and the concern is that they go from body fat to the brain. They go from body fat to organs, so fat tissues seem to play a protective role, some chemicals increase your load, so you can increase your load with a weight loss program too, so be aware of that. That's part of it.

Okay.

Listen, I know when you hear all this stuff it sucks.

It really... yeah.

You're like, "What I am going to do? What [crosstalk 00:49:08] are my options? How do I..." To be honest with you, you have to kind of figure it out and think through it and look at that risk/benefit ratio and figure out how you want to do it. The concern is with healthcare if people get stuck in their little fixes and their little theories and they don't understand the big picture, so they may have an adverse reaction. They're not picking the right strategy, because they don't understand these things. You can have a person just trying to detox, but that's not going to change biotransformation. You can have a person trying to take herbal products, but that's not going to get rid of lead, it's stuck in the tissue. You can have someone that has very high amounts of lead, they have no reactions. Someone who has very low amounts of lead, they have a reaction, because of their healthy antioxidant system. You can have two people that have very low levels of mercury, but one has mercury antibodies that are high, [inaudible 00:49:54] their inflammatory response, because they've lost their immune tolerance. Those are all the real physiological variables.

Right, everyone's different, everything... It's not-

There's all these different things that are out there.

... one best way at all.

Yep.

Yeah. Speaking of that, Johnny wants to ask you, "You've been mentioning a lot about having an antioxidant reserve, so is this concept then making sure that our antioxidant is always greater than our prooxidant-

Yes.

... and that will always make us less react to things?"

Yes. Absolutely.

Okay.

This is across the board for neurodegenerative disease, cardiovascular disease, chronic inflammation, autoimmune diseases, if you have more antioxidants than prooxidants, you have a protective effect. You have a condition where you prevent disease progression, whether it's heart disease or neurodegenerative disease. It's why it's so critical. Listen, it's not really that complicated. When people eat healthy amount of foods with tons of antioxidants in there and avoid foods that cause more free radicals like fried food and unhealthy, processed foods, and people that are nutrient deficient in substrates the body needs to help make antioxidants like vitamin C, vitamin E, vitamin A from healthy diet, they have more risk for chronic diseases that inflammatory like cardiovascular disease, like neurodegenerative disease, like autoimmune disease, like arthritis.

This is why it's so important to have a very healthy antioxidant diet lifestyle and even consider taking antioxidants, and lots of research that's been perspective over a period of time that showed taking antioxidants is very good for you. And then when they do epidemiological studies where they'll look at cultures where they have lots of green tea, which is loaded with antioxidants or even coffee or even lots of vegetables and fruits that are very high in this, they have significantly less chronic inflammatory diseases than groups that don't.

Yeah, okay. Debra's asking, "Can the antibodies you talked about be tested with Quest or LabCorp? Which labs are good to order the chemical antibody test?"

I know LabCorp and Quest are conventional medical laboratories in the US, they're only measuring levels, they're not measuring the actual antibodies. The lab I'm using for antibodies is Cyrex, so they measure the chemical antibodies. There could be other labs that are doing it, but that's the one I've been using, and I consult work with them, so I have a bias toward using them.

Okay, very good. Someone's asking about using zeolite.

Yep.

"Can zeolite..." A lot of questions, "remove aluminum, benzene from the brain? And does it really have the affinity and the capacity to clear the blood-brain barrier?" Just what are your thoughts? What are the downsides of it?

Zeolite is a compound that has the ability to impact an ionic charge, so it can work as a chelating agent, just like sulfur can. The key thing is that it's not going to pull stuff from tissue. It's not going to have intracellular effect. Zeolite's not going to cross your blood-brain barrier, get into your neurons, and pull stuff out, and then take it. That's not shown yet. But since it has the ability to ionically bind to things, then it has some chelating property potential and it's something you can consider taking if you feel like you have some exposure and you want to reduce your load. I don't think there's been... I don't know of any large clinical trials on zeolite, but the property of the compound, give it all the criteria it needs to be a chelator.

Okay. A lot of people are asking, would you just check heavy metals with someone who's diagnosed with MS, ALS? Would that be something you would [crosstalk 00:53:40]-

Would you check heavy metals with people that have chronic disease and neurological disease?

Yeah. They listed MS, ALS, Parkinson's, it's that kind of thing.

Right. The question is, depends. Because listen, every patient that comes in that is trying to figure out a strategy to deal with their chronic disease with diet, nutrition, and lifestyle and how they're trying to handle it from, let's say, a functional medicine approach, they all have... there's time issue, if it's progressive and going fast, or wasting your time going that not first. There's also cost issue, so for my practice, I'll let the patient decide. I go, "One approach is to test everything and see where all the variable are that maybe promoting a chronic inflammatory condition." And maybe we'll measure urine, pesticides and chemicals that are biotransformable, we'll check chemical antibodies, check blood level, see if there's any acute levels. If they want to deeper, then make sure they can get a challenge test done, and that's one option. But for me, I don't tend to do it first, because I like to work on their gut barrier, their immune tolerance, their diet, their lifestyle first, and then move into those kinds of things down the road. This is once again, this is where cost benefit comes in, but it's relation to cost and where you want to jump in with your clinical strategy.

Meaning, if someone comes in with, let's say, a neurodegenerative disease and their diet and lifestyle's already terrible, you can tell they have a chronic inflammatory disease, they even have celiac, they're still eating gluten, they're just inflamed all the time, then going after heavy metals is not the time to do it. You want to try and address those first. Versus somebody comes in and has a perfect diet and clean diet, everything is healthy, they just don't know what's going on, that would make me leaning more towards starting with the metals first or toxic chemicals or pesticides first.

Okay. Shawn's asking a very good question, "If one cannot afford chelation..." Shoot, hold on, "can one slowly eliminate intracellular heavy metals via other means? If so, what's the slow, low, safe, long game approach?"

The safe-

Intracellular.

... low, long approach is to prevent things from storing up in tissue, is to increase glutathione levels, and you can use things like zeolite, for example, any kind of natural ionic binding compounds, that'd be the way to do that. That's your best, safest approach, and also if you glutathione levels and antioxidant levels are healthy, it's less like your gut barrier and blood-brain barrier are breached, and one of the key things that really makes toxic compounds a real serious issue is when your antioxidant levels go down and your gut permeability is breached, so now you get systemic exposure through intrahepatic blood circulation to the rest of your blood, and the most vulnerable tissue for heavy metals are the brain. I would say take a lot of NAC, take a lot of antioxidants, take a lot of glutathione and go from there. That the strategy our family does, because we know we're getting toxic [inaudible 00:56:50] no matter what, but we can at least reduce our barrier breakdown and be less reactive to the chemicals we are going to build up in our tissue, just from environment.

Okay. Tim, "What do you think of porphyrin testing as a safer alternative to chelation challenge tests?"

I know some people who do porphyrin testing to look at that immune response, I just don't think that they're measuring the same thing, so I don't think it can be used as a substitute.

Okay. Some people asking you to do a talk on liver.

Liver? We have done a talk on liver.

I can't even remember anymore.

We have toxic chemicals getting into our brain, so we can't remember.

Don't say stuff like that. [inaudible 00:57:37]. Okay. "If one experiences intense allergic reaction to DMPS, like itchy lesions, what's the next best alternative for mercury chelation?"

Well, when you look at chelating agents, the ones that have the strongest effect, the ones that are done by prescription, are EDTA, DMPS, and DMSA. The most reactive one is EDTA. The second most reactive one is DMSA. DMPS is the safest. What did you she do? DMPS?

I totally-

If you did DMPS, you've already done the least reactive one, however, there can be unusual uniqueness's that may be involved, and it's also possible that it wasn't that you just had this skin inflammatory reaction unrelated to other things while you did that. Or you were pulling chemicals into your system and you didn't have enough oxidative, antioxidant support while that was happening and your mast cells dysregulated and you start to react to things in your environment, so the skin reaction. It could be that you may need a different chelate or it could be that you're not fit enough to do chelation yet. Maybe you have too much inflammation. Maybe your immune system is too dysregulated to handle it, but those are things to consider.

Okay. What... You already read that one, sorry. Let's see, "Would non-epileptic seizures or dystonic movements also be [inaudible 00:58:59] of the restless leg? And what type of testing and therapies could be done?"

Yes, all types of moving disorders, where you have an involuntary movement disorders, involve an area of the brain called the basal ganglia, and if it's hyperkinetic moving, it's moving on its own, it's an indirect pathway to the basal ganglia. The most common cause of that in adults will be a mini-stroke, a stroke or lesion.

Okay. John was asking, "Can one over do taking too many antioxidants/supplements?"

Can you over do taking too much antioxidants, not really. It's just expensive. Antioxidant supplements and food extractions can add up, some of the [crosstalk 00:59:40] things are expensive. I don't think you're going to get so prooxidative that you're going to have health problems. We're dealing with so much oxidative stress that, if you're taking a handful of different pomegranate extract, acai extract, resveratrol, turmeric every day and taking a multi-vitamin like the ACE, taking things like that and eating healthy diet, you're not going to over load, you're going to just probably get what you need. All of us are all facing with modern society, with the way our environment's been changed, that we're going to have a chemical and environmental inflammatory load, and the more strategies we have to deal with that the better we are. Okay, one last question. And by the way, thank you for all coming, and if you can, please share this with people, because I've got to tell you, this issue with chelation is not getting out there. We have way too many people that don't understand these risk/benefit relationships, and a lot of people are being thrown into chelation when they shouldn't be thrown into it.

I've been trying to get this message out for over 10, 15 years teaching, but it's not getting out there. So, if you can please get it out there that would be fantastic.

What's the message you're trying to get out there?

Share the link of this talk, and if you want to follow us, please, follow us on our Facebook page.

Okay.

Next.

Last one. Bummer. "Should antioxidants be liposomal or is that not necessary?"

Antioxidants don't need to be liposomal. The only reason glutathione does, is that glutathione is a large tripeptide, very large amino acid, and it's a very large sulfur amino acid, so it's hard to get through the gastrointestinal tract. The advantage of liposomal is it allows that large amino acid compound to get through the gut. Most antioxidants don't need... like turmeric, resveratrol those types of natural food products do not need the liposomal response to get absorbed, they have their effect on the gut right away. Okay, well, thank you everyone. I hope this information was useful to you, and thank you for joining us again, and have a great day.