Dr Mike T Nelson: [00:00:00] Welcome back to the Flex Diet Podcast. I'm your host, Dr. Mike T. Nelson. On this podcast, we talk about all things to increase performance, add muscle, improve your body composition, all within a flexible framework, and without destroying your health. On the podcast today, they've got a very special guest who has a brand new book that is also out.

The idea here is that stress is not necessarily the horrible thing that it has been made out to be. The title of the book is The Stress Paradox, why You Need To Stress to Live Longer, healthier, and Happier by Dr. Sharon Bergquist. And we had a really great conversation about all the different aspects. Of stress and why your body needs these different [00:01:00] types of stressors in order to maximize your health and longevity.

And it turns out that this overlaps really nicely with a lot of the concepts that I talk about in the Physiologic Flexibility certification, which is currently closed. But it'll open again in October. So on the podcast we talk with Dr. Sharon about stress and longevity, the different cellular responses, one of my favorite topics, metabolic flexibility, why stressors are important, the biochemistry of stress, exercise, and its different effects.

Fuel selection, like we talked about, cold and heat, why they are very effective stressors. What happens with exposure to them. How your stress response is different, a little bit from cold to heat, the role of supplements, and we even get into [00:02:00] mitochondrial health, the importance of cardiovascular fitness and much more.

So make sure to check out her book, which will be available this week as a podcast comes out, and I think you'll really enjoy it. It's been really good. One of the things I like is. When other people look at similar data and come up with similar conclusions, a validation. And she does go deep into the science, but it's a very easy read which is also really nice.

Our sponsors for the podcast, if you like ketones, check out my friends over at Teton Ketones Esters. They've got a great beverage where you can get 10 grams of ketones directly per can. Use the code, Dr. Mike to save some money. My full disclosure, I am a scientific advisor and ambassador to them. I also check out my friends over at Element.[00:03:00]

If you're looking for a great electrolyte supplement. That is my current favorite. I was traveling the past five. Six days and brought lots of element with me, which was amazing. I just had the raspberry one this morning. So go to the link

below for that, which is Mike T. Nelson LMN t.com. And without further ado, enjoy this wide ranging podcast here with Dr.

Sharon talking all about the role of stress and why you need to stress your body in intelligent fashion.

Welcome to the podcast.

Dr. Sharon, how are you doing?

Dr Sharon Bergquist: I'm wonderful. Thank you so much for having me as a guest.

Dr Mike T Nelson: Yeah, no problem. Thank you so much for writing your new book here and we'll talk all about that. But it seems like stress has a bad PR agent. [00:04:00] Like why, how did that happen and what should we do about it? Because I believe your argument is that we need some form of stress, but how you do that is also super important.

Dr Sharon Bergquist: How we understand stress, I think, is one of the biggest blind spots in medicine. Historically, we've done a lot of research on how stress harms, and that goes back to really the history of how stress was discovered as a medical concept in the 1930s with Hans Selye. And what we really haven't studied is how stress can benefit us.

So we know that too much stress or chronic stress harms and that is real and there's a lot of ways that it does that. But what we haven't really explored is what happens when we don't get enough stress. And that's the topic that I've written about quite a bit. And what we're realizing is Not enough [00:05:00] stress, which we term sustress, is just as harmful to us as too much stress.

And so this is really looking at how we can reframe our understanding of stress. And within that is the blueprint of how we can become healthier and live longer.

Dr Mike T Nelson: Do you want Selye's work? Because in, at least in the fitness area everyone talks about like the gas, even law, like general adaptive, syndrome, I think is what it was called.

What are some of the pros of that? And I also have some cons of it too, but I'm curious and what your thoughts of it and just explain what it is for people who may have never heard of it before.

Dr Sharon Bergquist: Right. So. The concept of stress, when it was explored scientifically, Hans Selye did experiments on rats, and he tortured them in so many different ways.

Oh yeah, those poor rats. They did not have

a good

Dr Sharon Bergquist: life. He did [00:06:00] spinal surgery on them. He would find just horrible ways to torture these little creatures, and no matter How he tortured them, they responded in a very similar way where they experienced stress, then they tried to mount a steady state way of coping with the stress, and eventually they all died and stress became understood as this general adaptive syndrome.

And we came to fear stress as a result of it because the assumption, or he extrapolated, that we respond to every stress in that same way. So whether it is being tortured, being threatened, running from a building that's on fire, to experiences that help us grow, or give us joy. So if we're preparing for our wedding day, the assumption was that the types of chemicals we [00:07:00] release from that type of stress are the same as the fear based stress response that we're so familiar with, the fight or flight.

But 90 years of research later, we now know that the biochemistry of our stress responses are very different. We don't just have a patterned fight or flight response. And the types of stress that bring us joy are generative or altruistic, align with our meaning and purpose. Those types of stress, Release a biochemical profile that actually makes us more resilient.

The hormones we release include dopamine, which is our reward hormone. We release endocannabinoids, which are, feel good type hormones. We reduce A whole milieu of chemicals that, at the end, make us a stronger, happier person. They help us bond with individuals through chemicals like [00:08:00] oxytocin.

So how we view stress impact how we use it in our lives. And I think if you look at modern research, we're seeing that we can utilize stress to our advantage.

Dr Mike T Nelson: Yeah, I feel like on the same line, Celia did a lot of groundbreaking research that no one had really codified before him, but I also feel like at the same point, at least in the fitness area, maybe it's different in medicine that we just took that viewpoint as gospel.

And even now, if you ask most trainers, they would, they could recite it, but. I think they forgot exactly what you said that a lot of it is very specific. We're still stuck at one level in this sort of general response, which Yes, as a human organism, you can only handle so much stress as an organism, but I feel like that got extended to forgetting the [00:09:00] individual responses and the different types of stressors, and the fact that in his experiments he didn't really do well, in my opinion, with quantifying the amount of stress.

It was like, let's just stress the shit out of these poor little buggers until they die, and Oh, they died again! Oh, sorry!

Dr Sharon Bergquist: And that is such a critical point the types of stress that I think are helpful to us as humans are brief, episodic stress, and he tortured them in a way that created a more chronic profile.

Yes.

Dr Sharon Bergquist: And that's the key. So our stress systems are adaptive. We've come to fear them, but they are there to help us. And that's gotten lost in how we communicate and talk about stress.

Dr Mike T Nelson: Yeah. And I think you would agree that. A lot of the predicament we're in with just general metabolic health is from a lack of stressors.

Like I, I love my little crazy phone and the fact that I [00:10:00] hit buttons on this last night and I went and picked up Chipotle, but in theory, I could have paid more money and just have it delivered to my door, even in the middle of a snowstorm. And I could have potentially never even gotten off my couch.

Oh, maybe they'll answer the door and get the food. So I feel like we're. Living in an environment that has made everything so much easier that we now actually have to opt to add stressors back into our life where we didn't really have to do that a hundred years ago as much.

Dr Sharon Bergquist: That's a hundred percent the case.

I think because our culture has evolved so rapidly, we've lost sight of what our bodies need to be healthy. And we think so much of. things that harm our health. We know that processed foods are harmful. We know we should avoid being sedentary. We don't talk enough about what have we removed from our life.

And that's exactly what you're talking about. These. little episodes of [00:11:00] brief, intense exercise, just getting up and doing things by just removing these stressors that our ancestors lived with as part of their daily lives. We are actually reducing our resilience and we're making ourselves more susceptible to the chronic diseases that we see today.

Dr Mike T Nelson: Yeah. The example is always given the exercise fizz world is. I'm probably one of the rare people that actually took a whole course on aerospace physiology when I was doing my master's in engineering. And the guy who taught it was super fascinating. He had spent time working at NASA trying to figure it out.

He was an exercise physiologist. This was back in the 90s, trying to figure out effective countermeasures. Spent time with the Soviets. Some of the early Soviet measurements on a bone mineral density in their heel from the early cosmonauts, where they really didn't know like what the effects were, never came back like the rest of their life.

They were still incredibly below baseline, because now you throw people in microgravity, like even gravity that we just experienced every day [00:12:00] on earth is not present. And even, fast forward to the international space station, the amount of time those astronauts have to spend doing exercise.

It's pretty high, and that's just to stay even, because they've even removed the stressor of gravity from their system.

Dr Sharon Bergquist: Yeah, and that's a perfect example, and if we look at what we've removed, so for 2 million years, our ancestors, roamed, they lived as hunter gatherers if you compare it to our lives today, for example, Right now, there are about 30, 000 foods that are edible.

We cultivate around 150, and only about 30 of those make it to our plate. Our ancestors, just out of survival, had to roam and try different foods. Some of them had mild doses of toxins. We co adapted with our environment. Exercise, of [00:13:00] course, we're all familiar how our lives have become more sedentary, but our ancestors were walking 15, 000 plus steps a day in the hunter gatherer days.

It dropped a little bit when we became an agricultural society. And of course, now we've drastically cut that where the average person's getting three to 4, 000 steps. So We've removed the stimulus that our bodies need and this has been very rapid through the span of about a hundred years and this is not to say that everything our ancestors did was healthy because that is certainly not the case and it's Also not saying that everything we do today is unhealthy.

So when we look at how the different things we do impact our cellular stress responses, we can take what our ancestors did and really tell at a molecular and cell level. What is beneficial to us and what really isn't, or could potentially be [00:14:00] harmful, so this is a little different from, I think, the Paleo movement.

There's been a lot of reference to living ancestrally, but what we're capable of doing today with the cell biology and the technology is research. Telling what's happening at a cellular level, right? Because we were made to select for genes that help us survive, not to make us healthy. And of course, there are so many ancestral lifestyles.

Some of our ancestors had more access. If they lived near water, they could access fish. If they didn't, they couldn't, right? The dietary patterns were so drastically different. So there isn't really. Something that we could say, Oh, our ancestors did X, hence we have to do X, because that X was so varied.

It was X, Y, and Z. And also we were selecting for just reproductive fitness and survival. But I think the key is now we can look with that molecular lens and make [00:15:00] ourselves healthier through our lifestyle habits. And that's what we want to adopt.

Dr Mike T Nelson: Yeah I agree. And if we drill down into kind of more of the biochemical, you mentioned food variety.

And it, to me, it's also one of these weird paradoxes where we have the potential to have a lot of variety. And it's just, it's almost like a Pseudo variety where most of it is interventions we've made ourselves, but in theory, we could have more variety of different things. Like you go to Peru, there's I didn't know there's that many different kinds of potatoes.

There's every potato, color of the rainbow, but in the U S it's Hey, you get a couple of versions here. And what was it? The bananas sold in the U S are only like one of like 13 or 14 different types of bananas. And we import millions of metric tons of literally only one type of banana.

So we seem to get. Fixated on only one thing. And my question is talk to us a little bit about how I think it was David Sinclair that might have proposed this that the nutrition we get through micro nutrition through [00:16:00] brightly colored things in nature as a way of sensing our external environment was like a Xeno hormetic response.

I might be getting the name wrong, but that we probably need to add more. Variety. So I'm a big fan with clients of eat from the rainbow. I think I stole that from Chad Waterbury at some point. If the only green thing in your diet is Skittles, then yeah, we should probably get some spinach, maybe some lemons and just look for different colors in your diet.

So talk to us more about kind of micronutrition and what, why are these things beneficial beyond what we've been generally told for reasons,

Dr Sharon Bergquist: so when we look at food, we tend to focus so much on macronutrients like fats, carbs, proteins, phytochemicals, which are plant chemicals, which are part of the micronutrients.

They actually aren't, are non nutrients. What they're doing for us is making us healthier, but they're not providing us with calories, but they play such an important role in our health. So phytochemicals give [00:17:00] us the antioxidants that. We try so hard to get into our diet, but for the past 50 years in medical research, we have viewed antioxidants as something that we get from, say, berries and different fruits or vegetables, and that they neutralize.

free radicals. So we're trying to tamp down oxidative stress. But when you look at the amount of antioxidant we would have to get from food to do it in a tit for tat way, we would need like micromolar amounts. And what we're actually getting from food is a nanomolar amount. So, there's really a puzzle in how do these antioxidants and these phytochemicals really benefit us.

And hormesis, and you referred to xenohormesis, is this idea that when we get these nutrients, they are a form of stress to our body, like a toxin. [00:18:00] And they are exciting, hormesis is from the Greek word to excite. They are exciting. Ramping up stress response. That's activating our endogenous ability to make antioxidants.

So these chemicals get through receptors that you send signals to ourselves. They activate a key transcription factor, so that's a protein that sits inside the cell called NRF2. It goes into the nucleus of the cell and it actually changes the

gene program that our cell expresses. And it's through that mechanism that we increase our own antioxidant expression.

Release, enzymes such as glutathione, catalase, superoxide, dismutase. And the idea here is that what we're getting from food is this relationship over billions of years of how we co evolved with food and how these [00:19:00] nutrients give our bodies what they need to become the strongest. And you may wonder, well, Why, why do we get these toxins?

And you mentioned the xenohormesis from foods and how did they become beneficial? So plants make these phytochemicals as a way to protect themselves, right? Plants can't flee from their predators. So what they have to do is deter. Any animal, insect, or even us as humans from eating them. So they make phytochemicals really as natural pesticides.

So they're intended to be toxic to us, but because we co evolved with plants and we needed to survive by having a variety of different plants. Our bodies evolved to detoxify very rapidly to low dose these toxins and only a small amount actually gets absorbed into our body from our gut, but it's just enough to activate these stress [00:20:00] responses.

And that became beneficial for a whole host of reasons because it became a signaling way, where we and our plants could live in the environment and get signals of drought, of excess sun exposure, and it was mutually beneficial. So that's exactly what. The phytochemicals are doing for us, and the reason we need the variety is because different phytochemicals can stimulate different stress responses, and we have stress responses that repair DNA, that repair our proteins, that repair our cells.

ramp up the antioxidant and anti inflammatory responses that stimulate autophagy, that stimulate growth factors, and the more variety we get, the more we activate our innate ability to fight disease, to slow down aging because that's what these pathways do.

Dr Mike T Nelson: Yeah, I think the variety of micronutrition is very [00:21:00] underappreciated, and I know it's something I've worked with clients, once they're out.

I'd say probably a higher level. Like we've got the basics down, like proteins, good fats. Good. We got the right amounts coming in. Like you're able to repeat it. You're being consistent, that the next level to me, I'm looking at. Okay. How

do we get more variety? All right. I have them do sometimes what I call the grocery excursion, go to your grocery store and just stay on the outer aisles.

And I want you to pick just one new item. I don't care what it is. Maybe it's a new fruit. Maybe it's a new vegetable. Maybe it's some new fermented, pickled ginger, whatever. I don't care. And then tell me what it is. And then your only thing you use to decide is just look at stuff and go, do I want to try this or not?

And it's funny how. Often, sometimes I have to do that myself. But people have come back and go, Oh, wow, I didn't realize I actually really like broccoli or onions were actually pretty good. I think it's easy to fall back into just our habits. And I'm definitely guilty of this too.

And the amount of [00:22:00] variety we get tends to go away pretty fast.

Dr Sharon Bergquist: I completely agree. And I work in internal medicine, so a lot of time I spend is helping people eat a healthier diet. And one of the first things people do is, of course, we try and reduce the processed food to more whole food. And most people then adopt a pattern, like you just said, we were creatures of habit.

So they'll tell me they start their day with a smoothie and that smoothie invariably, has some lovely fruit like strawberries and maybe spinach and soy milk, but then they get in that pattern where it's the same smoothie every day. And that reduces the variety. So that is often what's forgotten.

So from the American gut project, we know that we need 30 or more plant food. In people who have the 30 or more plant food per week, compared to people who have less than 10, the gut microbiome is the most diversified and hence the healthiest combination [00:23:00] of healthy bacteria and that is such an important goal so I can't emphasize enough that it's not just eating healthy, it's eating healthy.

But the diversity of the healthy foods, and like you said, there are just so many varieties. There are 10, 000 varieties of just tomatoes alone. We don't come close to exploring, yeah, what nature offers us.

Dr Mike T Nelson: What are your thoughts about some of the I'll leave his name out of it, but he's looks like he does lots of Instagram videos.

I call him the naked grocery getter, but it was their premise is that, Oh, vegetables are bad. They have, these, like you mentioned these toxins and they

do all these bad things for us, which I don't buy that. Now I will say that you do, you can find, I have had clients who, yeah, Brussels sprouts or, high fibrous things if their gut's not up to par yeah, there is a time and place where we do have to pull things out.

Make sure you get healthy, all that kind of stuff, et cetera. But I have a hard time buying for healthy individuals that we just need to, ah, just vegetables, just get rid of [00:24:00] them.

Dr Sharon Bergquist: I think you always have to look at things in a larger scale of, what's the net effect. Cause anytime you eat something, it stimulates so many biochemical pathways and you can't just zero in on one because our bodies are so complex and things can have so many effects.

So with, Toxins. Yes, certainly foods can have pesticide residues and there can be harmful toxins. But as we just talked about, there's so many beneficial toxins because our bodies have co evolved with our environment and we actually need some of those. And the term chemical in food is also one that I think gets misused or overused.

Right. So

Dr Mike T Nelson: eating all those chemicals. I'm like, well, what am I eating?

Dr Sharon Bergquist: Well, even, all these phytochemicals we're talking about, they are chemicals or plant chemicals, right? So you can't simply say, don't eat anything you can't pronounce because I'm going to [00:25:00] pronounce some of these phytochemicals for you.

So resveratrol, I think most people can say, but ferulic acid, for example, genistein, you can Go down the list like EGCG. There's so many that are hard to pronounce, but these are good chemicals. Like even a blueberry has a lot of beneficial chemicals that we can't pronounce. So I think we need to zoom out and say, look, We have at this point thousands of studies on vegetables as well as fruits.

These are done on conventional crops. They're not even organic because in these population based studies, there's, it's not really realistic to just look at organic foods. And consistently in these studies, we see lower rates of cancer, lower rates of heart disease. Improved longevity I think, and of course, reduced cancer rates.

So it's very hard to argue with thousands of studies that all of a sudden vegetables have become bad for us. In fact, there are very few things I think [00:26:00] that people in nutrition science agree on, one of the few things. There's very little,

Dr Mike T Nelson: unfortunately. It's a disaster zone. Right, and one

Dr Sharon Bergquist: of those few things is that a vegetable is good for you.

Dr Mike T Nelson: Yeah, that's what my annoyance is like, because now over the past few years, I've gotten questions about, Oh, I'm avoiding vegetables because of this or that. And I'm like, well, do you have any gut issues? What happens when you eat a vegetable? Oh, I heard on the internet. It's bad. And then you look at like the quality of their diet and you're going, Oh my God, like you're getting rid of these things that you need.

Dr Sharon Bergquist: That's such an important point. So there's. The human body works through bioplasticity and I think we lose this as an understanding. So if we, what I mean by that is essentially use it or lose it.

Dr Mike T Nelson: Yep.

Dr Sharon Bergquist: And if we remove vegetables, we remove all the fibers from our diet, we are actually We're losing the [00:27:00] bacteria in our gut that are breaking down these fibers.

And then if we start eating a bean, a vegetable, it's really hard to tolerate them without some GI distress because we've lost our capability. But, our bodies have so much plasticity, we are made to adapt, and if we start to reintroduce, but slowly, not In a big quantity, we can repopulate our gut with the bacteria we need and it's exactly the same with toxins.

If we give ourselves these micro doses followed by recovery, our bodies go through a state of, exposed to stress and it's in the recovery. That we actually build our capability to handle more and the whole idea of good stress is based on this concept of bioplasticity and in our brain and our brain cells.

It's neuroplasticity and that's what we want right in skeletal muscle. We want mitochondrial plasticity. This is the key. To helping [00:28:00] us become stronger as opposed to this avoidance, which I think is reducing our ability as a host to, fight viruses. Really deal with chronic disease, epidemic, premature mortality.

So I totally agree that avoidance and this restrictive mindset is taking us in the wrong direction. Yeah. I've written a fair amount about what I call a cockroach health and fitness. It's out of all the organisms, like you want to be more like a cockroach. Like you want to be like resilient to all these crazy things.

Dr Mike T Nelson: You don't want to. Restrict yourself because like you said, if you're going to lose your adaptive mechanism because it literally is a use it or lose it. So if you haven't had broccoli in four years, yeah, don't try to eat a pound of broccoli in one day. Like maybe start slow, maybe cook it first, like progressively add these things.

And last question on the biochemical, and we'll go to some of the other forms of [00:29:00] stressors too, is if people are listening to this and they're like, okay, what would be like your top. Like two or three things that you think, if most people ate more of these things, they would be better off because they could go to the store, they could go and try different things, but at some points that seems overwhelming.

What would you give us? I here's like the top one, two and three I would try to add if you can.

Dr Sharon Bergquist: Yeah. So I would say you can look at it as what are the. Phytochemicals that we want to get more of, and then we can also look at it as the foods that incorporate these phytochemicals that we want.

So, from a phytochemical standpoint, we know That there are clearly ones that are medically stimulate our bodies to get to that healthiest state through the cellular stress responses. So we know that resveratrol is key. Sulforaphane, which is in the broccoli sprouts, all the cruciferous vegetables.

That's another really important one. And I would say [00:30:00] allicin is another one that's in garlic and onions that opens these calcium channels in our body that help us through a different mechanism adapt to stress. Curcumin, I think people are familiar with. It's the helpful spice that's in a lot of Indian food.

The curcumin has the same stimulating effect. So if we. look at it as types of food. Like we just talked about, it is a variety of vegetables. And I hate to pick one or two because I don't believe, I don't believe in super foods. I think they're all super food. But I think, these fruits and vegetables, the spices in particular are extremely health beneficial.

Beans, lentils have a lot of these phytochemicals. They're probably a very underutilized food group in a standard diet. And I think from, those are probably what I would prioritize. And then, within there, there's so many [00:31:00] nuances. And with every food, of course, you can go down the whole zooming out at a macro level, what's the protein, the carbs, etc.

And then within that, select what an optimal regimen would look like.

Dr Mike T Nelson: Would you add beverages in too? Like I would throw coffee and teas in there because I think they often get left out. And my teas were saying like, go get the actual leaf, make your own tea. It could be herbal, it could be green tea, black tea etc.

But I think you would probably agree that's a good source too. There's no calories, easy to do, easy to add.

Dr Sharon Bergquist: You read my mind. I was going to throw in coffee and tea they are so rich in phytochemicals and particularly in these ones that are hermetically stimulating.

Dr Mike T Nelson: Awesome. What are the other, you said you categorized stressors into five categories.

What would be those categories for people?

Dr Sharon Bergquist: So beyond these toxins, these plant toxins, I would say the most impactful ones are [00:32:00] exercise and certain nuances to exercise. There is really a unique benefit to vigorous exercise or higher intensity compared to moderate intensity as it works through the lens of stress in our body, eating and the timing of our meals.

So getting into circadian alignment and then keeping our food window to the point where there's a slight stress on our body in, I'm going to call it normal eating, but what some people refer to as time restricted eating pattern, I think is a good stress on our body. Cold and heat. And they can be utilized in ways that can activate cellular pathways that can help us metabolically, they can help us improve our cellular resilience, and then mental as well as emotional challenges also activate pathways that make us essentially better at stress And they, release a [00:33:00] lot of chemicals, hormones in our body, brain derived nootrophic factor, regulate our stress responses.

So they're all brief, intermittent, and the key here is, they have to be followed by strategic recovery. I think that gets lost in this conversation around stress. So it's not just get good stress versus chronic stress, but you want to be strategic about giving your body time to recover because it's during the stress that the cells in our bodies become stress resistance mode, where we conserve energy.

We improve the efficiency of the cell. We discard parts of cells that are either old or damaged. We change how we. process energy in ways that become more efficient, but it's in recovery that we remodel and reconfigure ourselves as well as our organs and our entire body. [00:34:00] And that process can happen days to weeks after the exposure to the stress.

So it's so important to give yourself that time for recovery. If not, you're just stacking stress and stacking stress, and you can create deleterious stress even out of these beneficial stressors.

Dr Mike T Nelson: So you're saying I shouldn't do 37 degrees Fahrenheit in my cold tub for 20 minutes to start?

Dr Sharon Bergquist: That's exactly it, but I can't

Dr Mike T Nelson: make a cool Instagram photo, I can't put the video of me shivering afterwards looking like I'm gonna die,

Dr Sharon Bergquist: that's

Dr Mike T Nelson: not

Dr Sharon Bergquist: the goal. You really know it. I know, I'm

Dr Mike T Nelson: just, I'm kidding. Like

Dr Sharon Bergquist: 30 seconds. I

Dr Mike T Nelson: agree with you.

Dr Sharon Bergquist: And you're, yeah. The goal, that's not how our body works. If a little something is good, more is not better.

Dr Mike T Nelson: Yeah, and I think I've, I mean I've been a big fan of Fold for a while. I, converted a freezer to cold water immersion like right before COVID luckily. So I got to do it every day almost for a [00:35:00] year and a half. It was

super interesting. And I'm biased. I have a whole course that talks about these different stressors too.

But the biggest thing I realized was I knew this, but I thought, Oh, I'll run the experiment anyway. So I purposely got in there, got to the point I was shivering, was a miserable, could not warm up for three to four hours afterwards. Again, I do not recommend this. Don't do this alone.

All the caveats apply. And I did it for a while in my heart rate variability, like my stress scores. It was a. Big stressor. But if I started at 50 degrees and just did, the first time I did, it was just 30 seconds, and just progressively over a year and a half, got down to 42 degrees for five minutes pretty easily.

And I think there's this, like you said, this rush to be like, Well, I got to do the hardest thing ever. I got to do the hardest intervals ever and just working with clients. Like I've just seen it all the time where the dose response curve is a hard thing for people to think. Because like you mentioned, they [00:36:00] always think more is better.

And I often joke that just better is better. Like it's not always more. It's just, yes, you're going in the right direction, but you. Like you said, these things are stressors, and just like too much exercise can have, negative effects too. So with temperature, like, where would you have people start with that?

If somebody says, hey, I'm bought in, I've got the cold water immersion, I've got the sauna what do I do?

Dr Sharon Bergquist: Yeah. Ready to go.

Dr Mike T Nelson: Ready to go.

Dr Sharon Bergquist: Ready to go. So, this point that you bring up of what's the right dose really, what's the right temperature, I think it's so important to appreciate that there's so much individual variability.

Dr Mike T Nelson: Oh, it's huge from what I've seen.

Dr Sharon Bergquist: Absolutely. And you want to get to the point where you are past your comfort zone. So there's a little bit of discomfort, but not to the point where it's dangerous. There's no absolute temperature you have to reach and there's no absolute duration you have to reach to get the benefit.

You just want to get to that point of I'm [00:37:00] uncomfortable. I want to get out, but I'm not unsafe. Now, if you look at clinical studies, what does that fall into? So, a lot of the studies are done with cold water immersion. Most are between 50 to 60 degrees. And if you just turn on tap water, the cold tap water, in most climates across the world, really, you're gonna be between 45 and about 60 degrees.

So, Effectively, even if you don't have a cold plunge, you can just use your cold tap end of a shower, you could fill up a bathtub, if you really want to challenge yourself and you have more of a cold tolerance, of course, you could put ice in there too and really Ice

Dr Mike T Nelson: looks cooler on my Instagram videos.

Dr Sharon Bergquist: Well, I'll give you quite the spike of norepinephrine. Yeah. Absolutely. And I want to also impress that for the people who are cold intolerant, and if this sounds just so extreme, [00:38:00] there are also studies looking at turning down the thermostat in indoor air. If, you look at studies where they've in indoor air.

Indoor air temperatures around 57, 60 degrees in that range, wearing shorts, t shirt. After 10 days of just doing that, there's about a 37 percent increase in brown adipose tissue volume. Which is incredibly impressive. So for people who aren't familiar with brown adipose tissue, we have different types of fat cells.

The type that we have the most of course, is white fat that sits around our belly, creates the visceral fat that's harmful. That is our storage form of fat. Brown fat burns energy, so it's a very different type of fat that's beneficial, and the brown fat is really like our internal space heater, and it's using free fatty acids, it's using glucose to keep [00:39:00] us warm, so the more brown fat we have, it can raise our metabolism, but the problem is, as adults, we have so little, if any, brown fat.

And metabolically, it probably doesn't make a huge difference from a caloric expenditure standpoint. But if we can increase the volume of our brown fat, that holds much more potential to help us metabolically.

Dr Mike T Nelson: What are your thoughts about my own pet theory? And there is some data to support this, although I'd say it's limited, is that Brown fat in adults, I think is much more hyperplastic than what we realize, right?

Cause you can find scans of people that have almost none, like the study you mentioned, you can put them in cold air temperature for even, I think it's just 14 days. You can do a couple of cold water emergence, like not a lot. And you can actually see brown fat show up again. And what I've also noticed, like having not done cold water immersion for a while, and [00:40:00] it, maybe it's just my perception, maybe it's my nervous system, but.

It feels like those adaptations go away incredibly fast. If I, I did an experiment when I was doing the COVID stuff, I stopped doing it on purpose for just two weeks. I think I actually, when I started to travel again, and I came back and I felt oh my god, this almost feels like I've never done it again.

Like I did not expect it to feel like it disappeared again. Who knows what's actually going on? But what are your thoughts on that?

Dr Sharon Bergquist: Yeah. So I would view all of this again back to bioplasticity. If you were working out a lot, but then you were sedentary or, bedridden for a couple weeks and then you went back to the gym, you would have a huge drop in your ability to work

Dr Mike T Nelson: out.

Yeah. Especially at bed rest. Yeah.

Dr Sharon Bergquist: Absolutely. And it's somewhat similar if you go into just thermoregulated environments, we're always around air conditioning, around heating, and you [00:41:00] remove that kind of workout, if you will, of the cold exposure, you're gonna end up being far less tolerant to it and will have to work your way up.

So the bioplasticity happens incredibly. quickly on both sides of the equation, right? We can ramp up super quickly. One exposure to cold for people who do have brown adipose tissue is enough to activate it. And similarly on the downside, we can lose that activation, possibly even lose our brown fat cells from a lack of exposure.

So completely agree. And there's so much variability, like you said, in how much brown adipose tissue people have. We know that people who have lower BMI tend to have more brown fat. We know that people who have less cardiometabolic disease, like diabetes, heart disease, obesity, tend to have less brown fat, but we don't know if it's causal.

Like what's the chicken? What's the egg? I think that's [00:42:00] really a area for research.

Dr Mike T Nelson: Yeah. My, my thought is I think we're gonna find in the future, at least with cold water, or cold temperatures, that there's way more of a metabolic effect than what we realize. I've done some experiments, and I've had a couple people replicate this too, where Just two or three minutes of cold water, my glucose will be like low 90s, high 80s.

It'll drop into the 50s or 60s. And the weird part is, I don't feel hypoglycemic. Like I don't, I feel fine. I don't know if it was a blood flow issue, so I've tried to leave my hands out. So it's I don't know. But I've had enough people replicate that where, I don't know. There's something I think that because it is such an intense stressor, I do think there is more, Metabolic benefits to it that we just Don't understand yet, and I don't know what your thoughts are on that.

Dr Sharon Bergquist: Yeah, so I, I think there are really a couple parts to this, which is just fascinating. The first [00:43:00] is that the stress response that we evoke from cold exposure, again, it's not the fight or flight that Selye described. It's being initiated by our peripheral Nervous system, right? It's the cold receptors on our skin surface, and that is directly activating the sympathetic nervous system.

So what we see is a huge surge of norepinephrine in a 2000 study that gets frequently referenced. This was done in 10 men, so a small study, and again, just in men. The spike in norepinephrine was 530%. The spike in dopamine was 250%, but it's a different biochemical profile because in that study, they did not see a spike in cortisol,

right?

Dr Sharon Bergquist: If anything. After several weeks, they saw lower cortisol levels in people who were doing the cold exposures. They didn't see a spike in epinephrine, right? Just the norepinephrine. So to your [00:44:00] point about blood sugar, we assume stress is going to spike cortisol. The cortisol is going to raise our blood sugar, but the profile is different.

So metabolically can have a different effect. The other part to it is when we're exposed to cold, most of the energy expenditure is actually happening from muscles shivering, right? It's shivering thermogenesis being how our bodies heat us up with exposure to cold. There's shivering as it sounds when muscles

shiver and non shivering thermogenesis, which is what we're talking about with the brown fat activation.

Increasing our metabolic activity, but most of the chloric expenditure is from shivering thermogenesis for this simple reason that we have so much more muscle mass than we do brown adipose tissue that even though brown adipose tissue is a little bit more metabolically active we far more compensate for the lower activity with the skeletal muscle for the [00:45:00] energy expenditure.

And that's why from a metabolic standpoint, we Some of the studies that are doing the lower intensity cold exposure, like just cold air, but for a longer duration, if they get a person to a point of shiver, which again, it's still pretty miserable. All of this is

Dr Mike T Nelson: horrible. Those studies were done for hours of locking people basically in a freaking freezer.

Dr Sharon Bergquist: Exactly. Like I would personally rather go work out than be shivering for an hour, but they nonetheless stimulate a good amount of energy expenditure from that shivering thermogenesis. So I think you can definitely use it for metabolic health, but it's not easy.

Dr Mike T Nelson: Yeah, that's what I've often joked too, because initially you probably agree with this, like everyone's Oh.

Cold water immersion, like for fat loss, it's going to be amazing. And at first I was well, [00:46:00] maybe because you got, your heat temperature. Okay. So, and then I looked at the research and I probably similar to you. Like I tried to find any piece of research I could find on cold water immersion and talk to researchers who did, a lot of environmental studies for the military, like back, freaking decades ago.

And it basically would say that the only thing I could find is exactly what you multiple hours. In a cold room and to the point where you are shivering for a long period of time. in theory could result in some fat loss. Outside of that I could not find any data to show like any appreciable amount would be realistic for anyone to really do.

Dr Sharon Bergquist: Yeah. With any of these interventions, you have to ask yourself, what is your goal?

Yeah.

Dr Sharon Bergquist: Right. So if you want more of a cognitive or a mood benefit, then I think these are really good exposures to all these modalities, right? [00:47:00] Because you get the focus, the energy from the norepinephrine, the dopamine improves the reward.

You also release endorphins, you, you name it, the profile of the chemicals that help you cognitively and from a mood standpoint are incredibly effective. And at the same time, if you can resist that, If you have an urge to gasp and hold your breath when you're exposed to that extreme cold, then you can just breathe deeply or even count how many seconds you're in the cold exposure.

You're building your body's ability and your mental capability of becoming more resilient, right? Like you're flooded with all these stress hormones, and if you can stay calm and take deep breaths, it prepares you for other types of stress exposure.

Dr Mike T Nelson: Yeah, and that was like, in my own little experiment, that was like the biggest thing that kind of surprised me.

The two things that surprised me were, one, I thought I would potentially [00:48:00] see more physiologic responses, and I didn't really. The second thing was, even a year and a half later, doing it almost every day, because I wasn't teaching, I wasn't traveling, I wasn't going anywhere really, right before you get in, you're still like, This is dumb.

What am I doing? I don't want to do this. This is so stupid. Why am I out here again? Like I would have thought that would have gone away or at least dramatically decreased and it definitely got easier But it never went away right even before you get even was just for a few seconds And I think Andrew Huberman calls it like limbic friction, which I like It's you feel like you're having this internal battle of the prefrontal cortex professor part of your brain saying, Oh, this is good.

You signed up to do this. Look at all the testing you're doing in Your lizard limbic part of your brain is no, dumbass, you could die. Don't do this. This is stupid. But I think overcoming that and opting and choosing to still do the hard thing, like you said, I do think that [00:49:00] transfers to other aspects of your life.

Dr Sharon Bergquist: It does. And There's a lot of freedom that comes with that, like on the other side of getting to love the challenge. It's the freedom of confidence, right? This just sets off a cascade of just better confidence, better

ability to do other things. And what I love about these biological stressors is that oftentimes people are looking for solutions to psychological stress, right?

The chronic stress in our lives. Like how do we deal with our modern reality? And so much of the conventional wisdom is to try and reduce the stress, to draw boundaries, to learn to say no, maybe even reframe the stress. But you can use cross adaptation, and that's what we're talking about, which is essentially

Dr Mike T Nelson: Just said my two favorite words from the literature.

So continue.

Dr Sharon Bergquist: [00:50:00] I love it. I love it. We think alike.

Dr Mike T Nelson: Yeah.

Dr Sharon Bergquist: That we can improve our mental resilience by exposure to physical stressors and vice versa. Because we're The mind and the body and even the soul converge is at the level of our cells, then whether we are making ourselves healthier by exposing ourselves to a psychological stress or whether we're doing it through these bio, biological stressors.

At the end of the day, the most upstream factor that affects it. Our body and our health and how we function, how we feel is the health of ourselves. And I can't emphasize that enough because in what I do in internal medicine, I think, from one end, we spend so much time just diagnosing or treating disease.

And certainly I think there's a lot of attention on how we need to shift the focus to prevention and to quote root cause. [00:51:00] Even within root cause, I think we're so focused on reducing inflammation and there's not just one solitary pathway. The most upstream we can go to making ourselves healthy is cellular health.

And that's really where the future of how to be at our healthiest state is going. Yeah,

Dr Mike T Nelson: I agree. And then I think the cellular health component gets sort of Bastardized by some of the people, at least in the health and fitness world, of Oh, just take this supplement or do this, or like you said, Inflammation, it's all bad, you need to kill inflammation, and It's not unfortunately that simple, but yet we know, even if we don't have a hundred percent of the mechanisms mapped out, we know these stressors done in a

controlled fashion, exercise, potentially fasting, potentially micronutrition, the cold, the heat, et cetera, that we've got plenty of outcome based studies at this point to show [00:52:00] that they're beneficial.

Like we may not have 100 percent of the mechanisms mapped out. We may never get to that point, but we have enough. data on outcome based studies to show that it's incredibly beneficial. And sometimes I feel like people use a lot of the molecular madness as an excuse to not do some of the hard things that we've got very concrete data to show that we just need to do.

Dr Sharon Bergquist: Yeah and you just touched on probably one of the things that I see so much as patients come in asking questions such as, what supplement should I take? I think that we are focusing on the margins and we are bypassing these fundamental needs for our body. So our need for the exercise, for the phytochemicals, for Regulating the timing of our meals and doing some time restricted eating.

This is like the sunlight and water for a plant, right? [00:53:00] This is the foundation of our health. There are no shortcuts. These supplements that try to mimic these effects. A lot of what people are looking at is just one pathway, right? So for example, this is all just logical fallacy, right? So if.

If NAD goes down as we get older then taking NAD must be a good thing. We don't know if our bodies need NAD levels to be lower when we're older. And if it's detrimental, right, there are animal studies saying we're stimulating cancer cells by supplementing and raising a level beyond what our bodies can endogenously ramp up.

You can't just take one thing and create a logical fallacy that if this happens, then something else is true, because we don't have studies on supplements that show that. But we do have really the longest running [00:54:00] study in human history, which is two million years of our ancestors doing these good stressors and becoming stronger and healthier because of them.

So I just don't think we can skip. Those foundational things take the supplements with this assumption that they're going to hit one pathway and we've got to upregulate that pathway through the supplement as opposed to using our body's natural capability of doing it. Yeah. The NAD one is starting to bother me more now because initially I was like, Oh, okay.

Dr Mike T Nelson: That's a cool story. Oh, okay. So orally it does show up. Okay. It does go to the liver. Okay. This looks good. And then for years, I got so

much crap because I'm like, Okay, so you're telling me at a very simplistic level, and I'm not an NAD researcher at all, that this provides more energy to your body.

Yes. Okay, cool. So, as an exercise physiologist, show me the exercise studies. Show me that this thing increases your body's ability to perform exercise. If it's giving you more [00:55:00] energy, should you not be able to do more on an output study? And I think there's been two studies that have ever even looked at it.

And one of them was like, eh, maybe marginal. I may have tried some of it at two grams a day for four to eight weeks to see if it did anything other than a lot of money that went out of my pocket book. I could not find anything that was beneficial, but. The hard part is that the stories sell and at some level, yeah, we do need some physiologic mechanism, but I also think that the stories that work and the physiology backs it up are like the outliers, like everybody's looking for the next creatine monohydrate.

We've got tons of studies showing that creatine is very effective. It does create more energy. It is muscle tissue, but again, best case scenario, you're talking two to maybe 8 percent you're still way down in the single digits on something that we actually know is effective. Nevermind a whole laundry list of other things where it's I don't know.

[00:56:00] And

Dr Sharon Bergquist: you compare that to studies on exercise, improving energy and performance and how exercise can stimulate

Dr Mike T Nelson: two

Dr Sharon Bergquist: ends and NAD is exactly. So again, we have these time honored ways. That we can improve energy, that we can improve mental clarity, we can improve virtually any symptom and counter the pathways and the mechanisms that are leading to chronic disease above and beyond just inflammation and oxidative stress, that we can repair DNA, we can repair.

improve how proteins in our body, which we're doing most of the work in our body are looking and turn over those proteins so they can be healthier. We can recharge our bodies through the mitochondria, which is probably the most important component of cellular health. So we just can't take these logical fallacies and these inadequate studies and make assumptions.

Because I think [00:57:00] it takes us down a pathway that isn't what our bodies really need. Yeah, and I'm not against supplements. I still use some supplements. I will play with them because one, you get a lot of questions, and yeah, for me, it's interesting. But I'm also, when I talk to clients and answer questions on the old interwebs, I sometimes get the impression people are looking for a supplement to replace exercise.

Dr Mike T Nelson: Usually then I'll ask, well, what are you doing for exercise? What are you doing? And it's different if you're an elite level athlete and you've got everything dialed in to a Natsass and you're asking about, creatine or other supplements. Yeah, in that case it can make a pretty big difference and probably significant for you.

It could be worth a lot of money to you. The average person is like, well, I sleep four hours, nutrition is a floating trash bin fire, and I hate exercise. There's no supplement that's going to save you,

Dr Sharon Bergquist: a hundred percent. I think if you're trying to optimize, there's a place, especially, creatine has been so studied.

But. For a lot of people who [00:58:00] are just looking for ways to feel better to stay healthy, live a long life I just don't think they're going to be the answer.

Dr Mike T Nelson: Yeah. So talk to us about exercise. What type of exercise should we be doing?

Dr Sharon Bergquist: Yeah, so exercise, I think, of course, is such a broad bucket. And there are many types we should be doing.

And you can look at it again. What are your goals? What are you trying to accomplish? So I think the foundational pillars is, or we need some level of strength, resistance, we need some aerobic exercise, some balance and then some non exercise activity thermogenesis. I think that gets forgotten.

That's the calories that we burn when we aren't purposefully doing some type of movement. So whether it's how much we fidget, whether we're standing when we take a phone call whether we're pacing during a phone call as opposed to sitting, those things actually affect caloric expenditure more [00:59:00] than An hour of dedicated exercise.

So, I think when you look at physical activity guidelines, they're really three things that these physical activity guidelines are overlooking. So physical

activity guidelines are essentially 150 minutes of moderate intensity or 75 minutes of vigorous plus two days of strength resistance.

And of course, We know that about maybe a quarter of Americans are meeting those guidelines. So already that's a pretty high bar, but the misses with those activity guidelines are they don't make any allotment for this non exercise activity thermogenesis. That's what your Apple watch is trying to get you to do to get up and move on the hour, at least 250 steps to get This kind of basal amount of well, it's not really your basal metabolic rate, but just your base

Dr Mike T Nelson: level of movement to be a human.

Dr Sharon Bergquist: Exactly. That's exactly what I'm, so, so, I think it gets bucketed in [01:00:00] appropriately as just increase your steps. So at least the 8, 000, which shows a decrease in mortality, we can just get to that threshold. But more importantly, the physical activity guidelines. aren't talking about the importance of cardiorespiratory fitness, right?

Our aerobic capacity. That is such an important component of our longevity. And a lot of times when I think of an exercise routine I think this is such a huge component for. Just disease prevention when you look at the hazard ratio which is the risk of mortality or premature death when people have very poor cardiorespiratory fitness compared to the most elite hazard ratio is five, which is just stunning.

Explain how

Dr Mike T Nelson: like mind bendingly massive a hazard ratio of five is.

Dr Sharon Bergquist: To put it in context. So yeah, this is, I love this [01:01:00] question because we all know exercise is good for us, but we don't appreciate the magnitude of how life changing this is. So if you look at large studies, looking at how so many of the things we know shorten lifespan impact our risk of, dying prematurely.

For example, if you take tobacco use. The hazard ratio is 1. 4, you are 40 percent more likely to die prematurely if you smoke. If you take chronic diseases diabetes, hypertension, dyslipidemia, chronic kidney disease, they cluster 1. 3 to 1. 5 as a hazard ratio in terms of likelihood of mortality. You put in the mix poor cardiorespiratory fitness as we're talking about the lowest quintile compared to the elite, the 2.

3 percent in the top five as a hazard ratio, [01:02:00] there is no single component. Or variable that you can measure that can impact or predict premature mortality to a greater degree than your cardiorespiratory fitness. And there are 9, 000 studies in the medical literature supporting the importance of it. You have the American Heart Association making a call that this should be a vital sign.

And yet, We don't include it in how we counsel our patients in a medical context. We are focused on certainly chronic disease, but what I emphasize to my patients is that they can do far more for their own health. through exercise than I can ever do for them managing or even preventing their chronic disease.

So yes, it's the magnitude that is critical and cardiorespiratory fitness requires a little bit of that modification from the physical activity guidelines. To get [01:03:00] to a higher aerobic capacity and and that's really where the good stress comes in of the importance of intensity.

Dr Mike T Nelson: Yeah. Just to iterate that I often talk clients, like if you went from the lowest quartile, like you said, to elite level. And I would argue most people could get relatively close to the elite levels that they used in that study. They may not get exact, but they could easily get 80 90 percent of that benefit with training.

It does take time, it does take effort, all that stuff. It's not something that is completely unattainable for everyone. And if you were up at that level, you could literally do almost everything wrong. You could start smoking cigarettes, you could be drinking you could literally do all these things that we 100 percent know are detrimental to your health.

You would still probably come out on the positive side. I'm not, again, I'm not recommending that. What I'm just saying is exactly what you said. As a comparative thing, it literally is that much above a lot of the other things [01:04:00] that we know are massive risk factors.

Dr Sharon Bergquist: Oh, there's so many studies looking at people who exercise, but have chronic disease, looking at premature mortality compared to people who are, quote, healthy, but sedentary.

And you're absolutely right, that exercisers, even with chronic disease, live longer. So that is such a critical piece of our physiology. We have, most of our genes are driven to some degree. by exercise because our metabolic health and

our incoming energy and how we utilize energy has been the crux of our survival.

So it is such a key component of how to optimize our bodies. Couldn't agree more. I will also add that there are recent studies like Inigo San Milan has done these studies looking at healthy people, no medical condition, but sedentary showing that at a mitochondrial [01:05:00] level, there's already mitochondrial dysfunction.

So when you look at clinical studies, looking at or metabolic health in America, which is now estimated to be at 92. 93 percent of Americans not having good metabolic health, that is based on clinical factors. And if you add on top of that, healthy people who are sedentary, what that aren't being captured in that 93%, it is staggering how commonplace it is and how important it is for us to improve our mitochondrial health.

And exercise is the most powerful way for us to do that. Yeah, I a hundred percent agree. And the interesting part too, about the history of exercise physiology, which I won't give a whole history lecture on it. It's basically all founded on cardiovascular fitness. It isn't been until the last couple of decades, even looked at weight training and looked at the impact of muscle, all these other things.

Dr Mike T Nelson: The pro of that is. We have a ton of [01:06:00] data that's been accumulated over decades upon decades. We actually have replication of a lot of the critical studies, so it's not like this is based on just, one or two studies. This is literally reams upon reams of data that it's based on.

Dr Sharon Bergquist: A hundred percent.

And I think the other thing that is coming out from the data is the unique benefit of the high intensity, right? Yeah. I was going to ask

Dr Mike T Nelson: you, what should people do for actual exercise? So let's say we've convinced everyone. Cool. I'm on the aerobic exercise bandwagon. What do I do?

Dr Sharon Bergquist: So, I think if you, it depends where you're starting, right?

So if you are deconditioned and just starting, you do want to start with some moderate intensity exercise, generally exercise that if you rated your exertion on

a scale of exertion for one to 10, somewhere around like a five to six, where you can [01:07:00] have a conversation, but with. breathy sentences. Like it's not easy to have that conversation, but you can actually communicate more than just a few words.

So in that range, you want to do that first to build your mitochondrial base. You want to increase the volume of your mitochondria. And you want to of course, get yourself at a level of fitness in that. Probably takes several months, like even up to six months, to get a really good base. And then you want to add some intensity.

So, something like high intensity interval training doing that at least once a week, maybe twice. Certainly not for all of your workouts because your body does need recovery. The beauty of doing both, that moderate intensity as well as the peaks of high intensity. Is the effect they have on your mitochondria.

So we keep talking about the importance of mitochondria and for a good reason or mitochondria [01:08:00] are how we convert chemical energy from food to the energy currency that our body uses ATP. And mitochondria of course we now know do far more than that. They are the communication hub in our body. Our mitochondria communicate to our gut microbiome.

They communicate with our circadian biology, with our immune system. So when we have mitochondrial dysfunction, not only does our energy falter, where we can't do the basic tasks that our cells do to repair and renew themselves, recharge, clean themselves out which can increase our risk of disease, but we feel crummy, right?

Our energy is low. We poop out. And the importance of the exercise piece is that mitochondria are very plastic. So when we're doing moderate intensity, we can improve the volume. But when we get to those peak intensities, we [01:09:00] can stimulate mitophagy, which is a form of autophagy or cellular cleaning in our mitochondria that can make them more efficient.

So you're discarding the ones that aren't as efficient through the process of fission and then fusion. You are essentially selecting from mitochondria that are healthy. So like

Dr Mike T Nelson: recycling.

Dr Sharon Bergquist: Exactly. And that's, yeah. So, This part's

Dr Mike T Nelson: broken, get rid of it. Hey, this part's still good. We'll use it.

It's okay.

Dr Sharon Bergquist: Absolutely. So mitohormesis, a special type of hormesis that happens in our mitochondria involves mitochondrial biogenesis which is making you self. So if you look at. energy in your body, like renewable energy. The more we exercise, we are improving the energy that we're making by mitochondrial biogenesis of creating more mitochondria.

When we get to those intensities, We're also stimulating mitophagy. So we're producing clean [01:10:00] energy, essentially, right? We're making the mitochondria that are releasing all these free radicals and aren't working efficiently in our body out, and we're recycling them. And so our mitochondria are more efficient.

So. For people who have a visual of mitochondria from high school biology as one mitochondria per cell, which is how my biology, we now know that you can have anywhere from one to a thousand mitochondria in a cell. So the amount of plasticity in our mitochondria is huge. And if we aren't investing in making our mitochondria healthy, it's like.

Everyone's focused on what should I eat to get more energy? Well, if you're running on a clunker of an engine and your cellular engines aren't working right, I don't care if you're giving your engine the highest octane food and caviar, or whatever you want to give that's incredibly good food.

You don't have the ability to [01:11:00] utilize it optimally, for your energy. So we've got to make our mitochondria healthy. And the intensity of exercise is a key part of that mitophagy and that mitohormesis. And there are actually probably five unique benefits that's one of them, and we touched on cardiorespiratory fitness, even for the same level of work, you get more of cardiorespiratory fitness doing some vigorous intensity exercise, and about 40 percent of people are non responders to moderate intensity exercise for cardiorespiratory fitness, so that's a really important piece, and another huge one where it's gotten A fair amount of good research attention is the importance of lactate.

Dr Mike T Nelson: Yeah, George Brooks.

Dr Sharon Bergquist: Yeah. Oh, yes, absolutely. George Brooks has really changed how we understand lactate but one of the key things from a health

standpoint is when we get to those vigorous [01:12:00] intensities where our body is using the anaerobic glycolytic pathway to create the lactate above the level that our mitochondria are.

Yeah. Can clear them out and we have that lactate in our system as a brief stress that lactate is a signaling molecule signaling molecules are essentially talking to the rest of our body, and it is signaling, for example. GLUT4 transporters, the transporters that help you absorb sugar into cells through a non insulin dependent pathway.

You are getting about a 48 hour activation of those GLUT4 transporters just from lactate signaling the muscle cell. Lactate signals the PGC1 alpha. pathway that improves the mitochondrial biogenesis. It is such an important signaling molecule, as well as fuel source. And very recently, the understanding that we can do lactylation, [01:13:00] actually modify our genes through lactate.

It's so profound to me. Like for years, I've understood epigenetic modifications, which are ways we modify our genes through our environment and our choices. Through these modifications that affect which cells we turn on and which we turn off, right, through epigenetic modification. And we've known that is how our environment has a bigger component in our health than our genes do, because we choose which genes we express through our lifestyle habits.

But now the understanding that lactate can actually also modify our genes through lactylation. Is so profound again back to this importance of how our biology needs exercise to be optimal and for us to express our genes optimally.

Dr Mike T Nelson: Yeah, that stuff with lactate and it's just mind blowing like I had this little theory.

I called the 4s [01:14:00] model for all Substrates and one of them was signaling and people were like, oh, that's just a bullshit Like lactate doesn't do any signaling and now we know Protein does signaling carbohydrates do signaling fats do signaling lactate does signaling ketones do signaling, you know It's just how your body works and exactly what you said, especially with lactate It's generally a byproduct of very intense things.

It's on that intense end of the spectrum. So it makes sense that it would signal other things and other adaptations and things like that to happen. So, yeah, it's fascinating.

Dr Sharon Bergquist: And the other part that's so fascinating is chronic low grade exposure to lactate from people who have poor metabolic health and are essentially using more glucose than they can do fat oxidation.

How

Dr Sharon Bergquist: that has almost a dichotomous effect on our biology than these short bursts. of lactate. So with every molecule, you've got to [01:15:00] look at the context because it has such a different effect. When you have that low grade lactate from metabolic dysfunction, from processed food, from chronic stress in our lives, not sleeping adequately, we know That for metabolic health and that chronic low grade lactate increases the risk of chronic diseases like diabetes, heart disease, dementia, almost the entire different profile when you have these sharp bursts from brief intermittent stress.

That lactate starts to have these positive effects on cellular resilience, which again, to me, this is also profound because we think of these molecules as, is lactate good? Is it bad? Yeah. Is cortisol good? ? Is it bad? I want to keep cortisol down. I'm like, no, you don't. No,

Dr Mike T Nelson: You'd be dead if you crush all cortisol body.

Let's try that. In the eighties, it didn't go well, .

Dr Sharon Bergquist: No it's really optimizing the release of these molecules and to me that. is what is taken so out of context [01:16:00] and oversimplified. And I hope that if nothing else, people just realize that from our conversation.

Dr Mike T Nelson: Yeah, that's why I like the idea of metabox flexibility too, is that On the right end of the spectrum, myself and my buddy Luke Lehman from Muscle Nerds, we've measured just resting lactate in people and seen two, three, one poor bastard was at four millimolar.

This is at rest, and you find out they're a metabolic train wreck, their VO2 max is horrible, their fat oxidation is bad, they're stuck running that glycolytic. spectrum because that's the only system their poor body has left in a last ditch attempt to try to mitigate all of the stressors it has going on.

I've told people it's if You're trying to race in a three cylinder, you go and you've just got your foot on the accelerator the whole time. Like it's not gonna, it's not going to go well.

Dr Sharon Bergquist: Right. And it's so critical and, when I think of things from a health standpoint, [01:17:00] there's so much emphasis on things that damage our mitochondria, right?

Of how our modern lives are harming them through the processed foods, through sedentary, through chronic stress, through loneliness. But not enough on how do we not just play this as a game of defense, but how do we play on the offense, right? How do we actually make our mitochondria stronger and increase their volume?

So the way I view this whole good stress versus bad stress is think of yourselves as a bank account. And when we eat these processed foods, we're cutting into our bank account. We're making ourselves less healthy, our mitochondria less healthy. If we're sedentary, we're doing the same. We're taking money out of our bank account.

And if we take it all out and we're bankrupt, that's essentially disease. But we can deposit money into our account. We can make ourselves healthier. Through these brief stressors, through the phytochemicals, through the [01:18:00] periods of high intensity exercise, through circadian time restricted eating, through hot and cold, through mental challenges, and the more deposits we make, the more we can buffer what life brings to us.

And I think one of the most important concepts for health is to think of it as we need to build resilience. Right. We need to build our capacity to handle what comes our way. Be we fall so that we don't break a hip so that if we get suddenly ill that we don't end up in a hospital, right? We need to build this resilience.

So we need to make deposits into our cellular bank account and play this game on the offensive and not just defense. I think that is so important. This is all part of Mhm. Kind of making our country healthy again, right? It's this focus on prevention, but not just how to avoid disease, but how to [01:19:00] actually move yourself on the spectrum of health to this healthier state where you're more resilient.

Dr Mike T Nelson: Yeah. I preached into the choir. I a hundred percent agree. So where can people tell us more about the book? Where can they get it? When is it out? I'm yeah, I'm looking forward to, I'm going to get a copy and read all of it. I just looked at just different highlights of it and I'm like, Oh, we're like talking about the same thing.

This is awesome.

Dr Sharon Bergquist: I love this conversation with you because I think that there are certainly benefits of all these stressors for heat, the performance and exercise performance. And my lens is. After 25 years of, I'm still in practice, but I see patients and I see how people at a cellular level are not healthy and how important it is for us to really use these modalities to improve our health.

And of course, from there and a healthy population improved performance that, so I think that's. [01:20:00] Super important. So the book is coming out March 25th. I'm incredibly excited about it. You can find more about me and the book on my website, Dr. Sharon Berk with.com. I'm on most social media channels.

I'm on Instagram as the good stress doctor on X is the Good Stress Doctor. Similar with LinkedIn, although I do use my professional name as Dr. Sharon Rehberg was there. If there are any questions. Feel free to reach out. I love having these conversations. As you can tell, I get very excited about lifestyle prevention of disease.

It's what I've done my entire career. And happy to talk about any aspect of good stress as well as the tried and true things we've long known in terms of nutritional science and just any way that we can use our lifestyle to leverage a healthier state. So please yeah, reach out, follow. I love these conversations and I really appreciate the opportunity to have this conversation.

Dr Mike T Nelson: Yeah. Thank you. [01:21:00] And my last little point is all the principles are the same, right? Whether you have very low capacity and have multiple diseases and pain, everything else versus. And elite level athlete, you're still both human organisms. You still are operating by the exact same principles. How you scale it and what that looks like in practice is obviously going to be different, but the principles don't change.

Like those same, all the concepts, all the stuff we talked about applies, to both populations. So even though they look very different, those concepts apply all the way across the board, which is what's fascinating.

Dr Sharon Bergquist: Right. And it just goes back to our longevity genes, right? We have inherited genes from our ancestors now, again, for millennia.

And these are conserved, meaning evolution thinks that these are really important genes. Must thrive. Right. And whether you're a healthy, you're sick, male, female, we're activating these adversity genes. And that is [01:22:00] how

we can get ourselves to the healthiest state. So completely the case, I think we. Try and create these nuances of how to optimize nutrition, et cetera, which is important in a healthy population.

But at the end of the day, we all have mitochondria. We all have these pathways of energy metabolism. And you're absolutely right. This just applies across the board.

Dr Mike T Nelson: Awesome. So tell us the name of the title of the book again. You said March 25th and you get it on Amazon or where should they go?

Dr Sharon Bergquist: Yeah. So it's called The Stress Paradox.

Why you need stress to be healthier, happier, and live longer. And it is available on Amazon, Barnes and Noble, Target at all the major retailers. If you just go to my website, it has a link to pre order which I would greatly appreciate. Yeah. We'll

Dr Mike T Nelson: definitely put the link in for sure.

Dr Sharon Bergquist: Absolutely. Yeah.

So thank you so much.

Dr Mike T Nelson: Yeah. Thank you so much. I really appreciate it. I would highly encourage everyone to check it out. [01:23:00] And yeah, I love the conversation and thank you so much for all your time. Really appreciate it.

Dr Sharon Bergquist: My pleasure. Thank you.

Dr Mike T Nelson: Thank you.

thank you so much for listening to the podcast. Really appreciate it. Huge thanks to Dr. Sharon Bergquist for being on the podcast. Please make sure to check out her book. We'll put links to where you can find it. To below it is entitled. The stress paradox, why you need to stress to live longer, healthier, and happier by Dr.

Dr Mike T Nelson: Sharon Bergquist. And if you enjoyed this, we've got a ton of other great episodes coming up. I think you'll enjoy them. Also be looking for ketones. Make sure to check out our friends over at Teton Below. Full disclosure, I am a scientific advisor and ambassador to them. Looking for electrolytes. Check out our friends at Element with the link down below.

You want more information from me? Make sure to get onto my daily newsletter. [01:24:00] We've got tons of great stuff that goes out each day and it's completely free. And if you hop on via this podcast, tell me you listen to this podcast and I'll send you a free gift also. So we have the link to that down below.

Thank you so much for listening. I really appreciate it. Again, big thanks to Dr. Cheren Bergquist for sharing all of her wonderful information. We can do us a favor by hitting the old like button the download, subscribe, kicking it over to a friend who you think may need to listen to this podcast. Really appreciate it because that helps us to get more plays and distribution and all that good stuff with the old algorithms.

Thank you so much. We'll talk to all of you next week.

Speaker 2: You are my sunshine. My only sunshine. Why you old fool? What? I'm not your son. And my name's not shine. [01:25:00] He calls me an old fool.

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