

Harnessing GABA's Therapeutic Potential to Improve Your Physical and Mental Health

A Special Interview With Dr. Scott Sherr

By Dr. Joseph Mercola

Dr. Joseph Mercola:

Welcome, everyone. This is Dr. Mercola helping you take control of your health. And today, we're joined by Dr. Scott Sherr, who is going to enlighten us about a variety of different topics, including GABA, or gamma aminobutyric acid, which is a really great topic, especially if you struggle with sleep and a variety of other disorders. It's quite converse to serotonin. It's almost like the direct opposite. It's what you need, and serotonin is what you don't need. So, welcome and thank you for joining us today.

Dr. Scott Sherr:

Thanks, Joe, for having me. It's a pleasure to be here. Yeah, GABA is the unsung neurotransmitter. It's the one that doesn't get a lot of press. The fancy ones like serotonin and dopamine and norepinephrine get all the press, get all the news, everybody cares about them, but they don't realize that GABA is 20% of the brain's neurotransmission. And when you combine glutamate, which is actually its opposite, in the sense of glutamate being the excitatory neurotransmitter and the main excitatory neurotransmitter in the brain, and GABA being the main inhibitory neurotransmitter. Those two are always working in conjunction and in balance. And in fact, it's this excitatory transmitter glutamate that actually turns into GABA in the brain.

Dr. Joseph Mercola:

Interesting. So, [I] appreciate that background. So, unfortunately, I neglected to mention your history and your background. So, why don't you tell us a little bit about yourself, your medical training and how you got into practicing natural medicine?

Dr. Scott Sherr:

Sure. So, my name is Dr. Scott Sherr. Thanks for everybody listening today. My background is I'm the son of a chiropractor. I grew up in New York and my father's still a chiropractor in New York for over 40 years. His name is Dr. Alan Sherr, in the Northporth Wellness Center there, where I grew up in. So, I grew up very much out of the box. There really was no box at all.

And at that point, I decided to go to medical school after speaking to my father for multiple – I remember multiple weeks as I was in college and thinking about whether I would go to chiropractic school or decide to go to medical school. I decided to go to medical school thinking I could bridge the chasm between the alternative medicine, the world of chiropractic and the

conventional world that I really had no idea what I was stepping into, to be honest. So, it was a journey.

And I first gravitated toward hyperbaric oxygen therapy and I learned about it in medical school. And then when I was in residency, and then after I finished medical school and I went into my internal medicine residency and finished that, I created a practice that integrated hyperbaric oxygen therapy with numerous other modalities, and I also created an online platform where I do telemedicine and consultations.

And I work with people all over the world, and I work with clinics all over the world using hyperbaric therapy as the fulcrum or the main focus point of what I do. I then gravitated toward a colleague of mine that was working in a foundational approach to medicine called Health Optimization Medicine and Practice, which is an educational platform. It's a nonprofit that's training doctors and practitioners, including myself on how to optimize health. And from there, I've kind of delved into multiple things, including neurotransmitter balance, like GABA. We've talked about methylene blue in the past, you and I, Joe, and other things.

That kind of work on how you can optimize the body now while you're looking at optimizing it over the long term. So, people need help now. We know that and people are hurting and having issues that need to be addressed now. But over the long term, you can hope and the idea, really, is that you can optimize health over the long term. That takes time, though. And that's foundational lifestyle, dietary, supplementation [and] data-focused as much as possible, but you need things that can help them right now. And knowing about the neurotransmitter balance in the system is really, really important as well. So, that's where GABA kind of comes in.

Dr. Joseph Mercola:

Okay, great. So, you didn't learn your skillset and information about natural health from medical school. There's no way, they don't teach it there.

Dr. Scott Sherr:

No.

Dr. Joseph Mercola:

So, anyone in this field has to acquire it separately. So, maybe you can briefly summarize your journey into acquiring the skill set, and then specifically at the end, discuss how you found Ray Peat and that story, because that'll be interesting and we'll discuss that a little more, then we can dive into GABA.

Dr. Scott Sherr:

Well, I think my journey really started off when I was a kid. I didn't look at anything as you would typically when you're going through a conventional upbringing, with going to McDonald's

and going to regular doctors and those kinds of things. So, I've always been very much in line with thinking of things outside the box, in that case. And then as I finished medical school and residency and started getting involved in hyperbaric therapy and creating an integrative approach, I just started learning more and more about what was out there, and what was available, and what was really necessary for optimizing health rather than, as I mentioned, just treating disease.

And I already knew, in concept, all of that was ongoing in the sense that the way I grew up and the way I saw people heal and the way I saw people's diets change when I was a kid and then their allergies would go away, for example, or doing an adjustment and their neurologic presentation would improve. I was growing up in this office and seeing all that. So, I think for me as an adult, it was more trying to – or not even trying, just the flow of understanding how to actually do this in clinical practice within my own realm of understanding and curiosity and things like that. And so, as far as Ray goes, I'm not as into Ray as you are, Joe. I know many of his work, and I know and I appreciated all of it, but I'm not – I would certainly not call myself a student of his work to a significant degree as much as you are.

Dr. Joseph Mercola:

All right. Well, [I'm] definitely a student. I've just started learning it, but he was really a genius. Passed away about a year ago as we're recording this. So, having that perspective when you went through medical training must have been a challenge. I know a few people who did that. Most people convert to natural medicine after medical school, not before, because they're so opposed to the whole paradigm that has been captured since the beginning of the 20th century, essentially, that they're not going to commit to it. They know it's fraudulent and it's absolutely opposed to what they believe. So, how did you reconcile that?

Dr. Scott Sherr:

Yeah, it was a challenge. I mean, I kind of put my blinders on for a little while and just did what I needed to do to get the training. And look, I think that we all can agree that there's a good reason why we all need conventional medicine sometimes. Working in an acute care hospital, for example, you need to do what you need to do to get people better. It's not like you'd want people to be there and presenting the way they are, but unfortunately, they are, right? So, I think that there's certainly a role for conventional medicine. I think especially acute care medicine, there's a lot of problems with it, but it does do what it needs to do to get people out of the hospital.

The problem I think is in the primary care world and the outpatient medicine world where things are very, very broken overall. So, if you have a bleeding ulcer and you need an endoscopy and a clipping, you need to go to the hospital and get that done and that's something that we can do very well now. What we can't do is prevent that ulcer from happening in the first place very well. And I think that's really where the disconnect is.

Dr. Joseph Mercola:

Well, conventional medicine can't.

Dr. Scott Sherr:

No, conventional medicine cannot do that, right? So, as a result – I mean, for me it was knowing that I always had a feel of where I was going to go with my practice and with where I was going to go overall. It was just a matter of understanding what I needed to know now. And still, in the acute care setting, I think that a lot of the knowledge that I've gained makes a lot of sense and still applies in a lot of ways, but the outside system is just broken in the conventional world. And that's why we need other systems and we need people that are interested in getting out of the system. And you're right, Joe, most people get out because of their own personal health challenges.

That's been my experience talking to a lot of people in this world, is that doctors themselves had conventional medicine fail them in many ways, and they had to figure out their own ways out of that bubble, the conventional bubble, to actually heal themselves. And then they become involved in the alternative or the wellness, whatever, the integrative world, whatever you want to call it. And so, that's not my journey, but certainly it's many journeys of those that I've met in this world.

Dr. Joseph Mercola:

Okay. So, I think you probably told me in the past that you hadn't done a deep dive with Ray Peat. And I apologize for not recalling that. I knew you knew of his work for sure, and you weren't opposed to it unlike most physicians. Well, most physicians haven't heard of it, but if they did, they would be opposed to it as I was for over 30 years. I knew of Ray's work in the '80s. He was just – in case you didn't know, he was really, as far as I'm aware, the first professional to widely acknowledge and teach that seed oils were dangerous. In the '80s, he was doing that. In the '80s, which is crazy.

Dr. Scott Sherr:

I didn't realize that. Yeah.

Dr. Joseph Mercola:

Yeah, which is what really attracted me to his work because he was so far ahead of his time. Most people, most physicians who are aware that there is an issue didn't really catch on until the 'teens of the 21st century, 30 [to] 40 years later.

So anyway, the reason I mentioned that is that he wasn't just focusing on linoleic acid and seed oils, omega-6s, PUFAs (polyunsaturated fatty acids), but his primary work was really in hormones, human hormones, and he did his Ph.D. thesis in estrogen. And the reason I mentioned that is that – do you have any strong positions on estrogen? Do you believe in bioidentical hormone, estrogen replacement therapy? What's your position on that or do you prescribe it?

Dr. Scott Sherr:

I don't typically prescribe it. I do work with providers that do use bioidenticals at times.

Dr. Joseph Mercola:

Okay, so you're not an advocate of it necessarily.

Dr. Scott Sherr:

Well, I think it depends on the situation in general.

Dr. Joseph Mercola:

Okay. All right. Because it seems, for the most part, there's a very limited indication for that, if at all. I'm not convinced that there is, largely because estrogen is a contributor to cancer. It really does the exact opposite of what you want to do. The reason I mentioned estrogen is that it's very similar to linoleic acid, and serotonin is mixed in there, too, because the linoleic acid and the estrogen both impair mitochondrial function and they decrease metabolic rate. They suppress your thyroid, which is not a good thing.

Really, optimizing mitochondrial function is one of the things you want to do. And the reason I shifted to serotonin before we started talking about GABA is that typically, that is the "happy hormone," the one that's thought to be the source of most people's depression, and the neurotransmitter that is really targeted with almost all the pharmacological approaches, the most pernicious, of course, being the SSRIs, or [selective] serotonin uptake inhibitors, like Prozac or Zoloft. And they're very, very dangerous drugs.

There is never an indication to use those, in my mind. It's criminal malpractice if you understand the biology of it. In fact, you want to do the exact opposite. You want to lower serotonin. And this is why you have to be careful of taking tryptophan because tryptophan is a precursor of serotonin. And not that you don't need any tryptophan, because serotonin is a precursor for melatonin. You need some, but excess is just a huge problem. So anyway, that's just what I wanted to say on that.

Dr. Scott Sherr:

Sure, I mean, I guess what I would say-

Dr. Joseph Mercola:

And if you won't make any comments on that, we can delve in, divert over into GABA.

Dr. Scott Sherr:

Yeah, I think that there is some controversy on the serotonin side, but I do agree that all the data that's come out over the last several years does make it pretty clear that it's not really doing anything for depression per se. And there has been, unfortunately, a very significant focus on that with the drugs that we've had ongoing for many years with black box warnings. I've had friends and friends' sisters commit suicide using SSRIs. This in the early days. Actually, I know somebody who got that black box warning on the SSRIs themselves. So, they're a big deal. And I think that what I've seen in clinical practice is that usually there's so many other ways to approach people that have depression, anxiety [and] sleeplessness, and one of the things that I've found out over the last several years is that many of these people actually are GABA-deficient and that becomes a big issue.

If you can actually start, then, approaching it from a GABA deficiency perspective, then you might see a significant change. One of the things that I didn't realize before I kind of got into this world is that the GABA deficiencies associated with so many things. It's associated with anxiety, with fear, with depression, with a short temper, with phobias, which are fears, impulsiveness, disorganization, addictions, and it's even associated with schizophrenia and OCD (obsessive-compulsive disorder). And then not only just mental health symptoms, but you can have things like IBS (irritable bowel syndrome) and diarrhea, hypertension, tinnitus, chronic pain, migraines, allergies, frequent urination, flushing, sweating, salt cravings [and] muscle tension. These are all things that could be signs of GABA deficiency. And many of the people listening here may have been prescribed an SSRI, for example, for some of these symptoms, but it may not have been related to a serotonin deficiency. Actually, we know that depression is not related to a serotonin deficiency. That's been well-studied over the last several months to years now. We know that it's likely related to many other things. And I think one of the major components is that this significant amount of neurotransmission, the GABA –

So GABA, for those that are listening, is the “brakes” in the brain. It decreases firing of neurons. So, what happens is when GABA binds to its receptor, it prevents that neuron from actually firing. So, it's usually what we would call a postsynaptic neuron. So, the presynaptic neuron is firing and the postsynaptic neuron doesn't fire because GABA is around it. It actually does something called “hyperpolarize” in that case. And these GABA neurons are all over the brain, they're in every single location and they actually function as something called an “interneuron” many of the times. And an interneuron is a neuron that's between other neurons.

So, you can see these cool pictures of these gigantic serotonin and dopamine neurons, and then in between them are these little GABA neurons, but they're regulating all of the firing between all of these neurons. So, they're extremely important for learning and for processing and for memory and for skill acquisition. So, it's not about how much you can intake in your brain, actually. It's how much you can actually stop that information from coming in so that your body and your brain, in this case, can actually process it. And so, you can learn and understand and have new memories and skill acquisition. So, I think the big challenge, and it's a big shift for people, is like, “No, this is not about serotonin. This is not about even dopamine.” Although dopamine is certainly a problem. I think our attention spans these days are all because we're

dopamine-deficient to some degree because we're all always looking for that next hit of dopamine when it comes down to it.

But if we're focused on those, we forget that if we can actually enhance and balance the GABA system, we can truly see a significant shift in the health of our patients and clients. And I've been seeing this in real-time, looking at the whole arc of GABA production, everything from the amino acid glutamine, which is where we start here, that gets converted into glutamate in the brain. And everybody's heard of monosodium glutamate, I'm sure, from Chinese food and things. Glutamate is your excitatory neurotransmitter. And then from glutamate, you get converted into GABA. And GABA gets only made, for the most part, the majority, like 99% of it, in the brain from glutamate. And you need the cofactors vitamin B6 and magnesium to do it. So, if-

Dr. Joseph Mercola:

Well, let's stop there for a moment if we can, because you're a fountain of information, which is great. Now, the GABA is an inhibitory one, an inhibitory neurotransmitter, and glutamate is excitatory.

Dr. Scott Sherr:

Right. Correct.

Dr. Joseph Mercola:

So, can you walk us through – I mean, there's got to be throttles and modulations in that production of GABA from glutamate, because it can go either way, right? It can go to the excitatory neurotransmitter or it can go to GABA. So, what modulates that?

Dr. Scott Sherr:

Right, so it's a one-way conversion from glutamate to GABA, so it doesn't go back and forth like that. Typically, the challenge will be that if you have a trouble converting from glutamate to GABA, you're going to have excitatory-like symptoms overall. So-

Dr. Joseph Mercola:

Oh, so it just backs up? And then it [inaudible 00:17:09]-

Dr. Scott Sherr:

Yeah, exactly, exactly. So, you-

Dr. Joseph Mercola:

So, it's not converted? Okay, thanks. That was my confusion. Just straight to GABA and the problem is making sure it facilitates. And you mentioned there are cofactors, is it vitamin B6?

Dr. Scott Sherr:

Right, yeah. There are cofactors, vitamin B6 and magnesium. And also, there's a lot of other things that are going to affect the enzyme called glutamate decarboxylase that converts glutamate to GABA. One of the biggest ones is infection. So, if you have a chronic infection or acute infection, you're not going to be able to convert. If you have chronic stress and you have chronic cortisol and glucocorticoid elevations, that's also going to prevent this enzyme from working as well. But the bigger things would be vitamin B6 and magnesium. And I think, as you know, Joe, most of the U.S. population is magnesium-deficient-

Dr. Joseph Mercola:

Mm-hmm, 80%.

Dr. Scott Sherr:

-and a significant are vitamin B6-deficient, too.

Dr. Joseph Mercola:

Well, that is interesting because if your stress hormones are elevated, you're going to decrease the production of GABA.

Dr. Scott Sherr:

Right, exactly.

Dr. Joseph Mercola:

And this is one of the reasons I exited low-carb and intermittent fasting, because that's one of the side effects of that strategy, is it radically raises your stress hormones, epinephrine [and] cortisol.

Dr. Scott Sherr:

Yeah. Interestingly, though, the ketogenic diet does increase GABA production itself and that's related to the ketone bodies themselves doing this. So, there is some balance there with the glucocorticoid elevations, but certainly the acute stress of intermittent fasting, for example, it may be depleting your GABA reserves to some degree. And then it depends on, again, what is-

Dr. Joseph Mercola:

[inaudible 00:18:41] probably. Yeah.

Dr. Scott Sherr:

Yeah, it depends on what is your stores of glutamate that you have already and how well are your enzymes working to convert it over. And that's what I'm always thinking about. Especially people that are not eating very much, they might not be getting enough protein in the day, for example, and as a result of that, they're not getting enough glutamine. And so, glutamine is [an] amino acid that's extremely important for the health of the gut lining. So, if you have any leaky gut, for example, or stress in the gut with infection, or if you have a leaky brain, which is actually very common if you have a leaky gut, you're probably going to be needing significantly more amounts of glutamine to get into the body and actually convert to glutamate because you're using all the glutamine for your colonic cells, which is the main fuel of your cells in the gut themselves.

So, you have to be looking at the whole picture when you're thinking about this. And the other thing is that if you're taking GABA as a supplement, GABA supplements don't typically work because the molecule itself, GABA, is too big to get across the blood-brain barrier. However, if you have a leaky brain, they may work. So, if you're taking GABA and it's working, it may be because you have a leaky brain, which sounds scary, but that just means that you have a leaky gut as well. So, it's something to be aware of, that if you're trying to enhance the GABA system, you're going to be thinking about all the aspects of the biology — leaky gut, leaky brain, glutamine production, glutamate conversion [and] cofactors.

And then if you're looking to supplement with enhancing the GABA system, you have to be thinking about other things rather than just GABA itself to enhance the system. And there are many other ways to do that. There are herbals, there are fungals, there's even different ways of attaching GABA to other things to help it get through the blood-brain barrier, too.

Dr. Joseph Mercola:

Well, there's some controversy on that. What you've quoted was widely believed in the conventional medicine community, that GABA doesn't get past the blood-brain barrier, but there's a shift. The Ray Peat community does not believe that and I'll see if I can find the articles on it, but I know Georgi [Dinkov] wrote an article on that recently, that they're – alcohol is a GABA agonist, which is one of the reasons why many people enjoy it, and I'm sure you knew that, right?

Dr. Scott Sherr:

Well, of course. Alcohol has a high affinity for the GABA receptor. This is where benzodiazepines also will bind. This is where barbiturates and Quaaludes, and those are called allosteric binding sites of the GABA receptor. So, GABA binds to the receptor, and it's got all these other binding sites on the receptor where other things can bind. And that's where – so alcohol and benzos and barbiturates bind very tightly to the GABA receptor. And when they do that, it enhances GABA production and GABA function. So, you have more of the inhibition. So yes, this is where you have the alcohol of – that's how alcohol works.

But unfortunately, things like alcohol, benzos and barbiturates are highly addictive because they bind so tightly to the GABA receptor at their sites, and then they cause conformational shifts in the receptor themselves. And then if you go cold turkey off of those things, it could potentially cause, it definitely can cause withdrawal and even death. But certainly, there's tolerance and dependence and things like that. But there are other natural equivalents that are much safer. Things like kava, for example, have been known for thousands of years to affect the GABA receptor without causing any potential addiction and withdrawal and tolerance, and it's been pretty well-described there. So, there's that. There's honokiol, which is from magnolia bark. This is another one that binds to a receptor site outside of the GABA receptor itself but actually does the same thing. It helps with enhancing the GABA production.

Valerian root is another. People know valerian root. Valerian is also another one that increases GABA production in the brain, but it doesn't bind to the GABA receptor itself. It binds to a separate site, these allosteric sites. There's something called N-nicotinoyl GABA, which is vitamin B3 attached to a GABA molecule, and this is something that, because it's attached to B3, very easily gets through the blood-brain barrier and then hydrolyzes to vitamin B3 and GABA in the brain. And as a result of that, you have increased vitamin B3 and GABA directly. So, that becomes a GABA agonist, also called an orthosteric ligand, at the GABA receptor. So, you have other ways to modulate the receptor, even if you can't get GABA in directly, is my understanding.

Now, I have heard that nanoliposomal varieties will potentially work because they're attached in a fat molecule itself. And then if you take very, very high doses of GABA directly, that also may have an effect as well. But, at least clinically, I've seen this in patients, that they take GABA. If they have a pretty good gut overall, they don't have any effect of the GABA supplements themselves. But then I give them vitamin B3 attached to GABA, if we give them these allosteric molecules like the ones I've just described, then they start having significant improvement, and then their anxiety and stress get better, and then they sleep better as well. And that's why valerian has been known for many, many years as a great sleep aid for these reasons and doesn't cause the same potential addictive or risk factors, the risk of the dependence, withdrawal and addiction that the benzos and the barbiturates and-

Dr. Joseph Mercola:

Oh gosh, [inaudible 00:23:54].

Dr. Scott Sherr:

-and the alcohols of the world will do.

Dr. Joseph Mercola:

Alcohol will help because it's a GABA agonist, but it destroys your sleep architecture.

Dr. Scott Sherr:

Right. That's a huge thing. And then a lot of the other sleep drugs, as we know, will also destroy sleep architecture.

Dr. Joseph Mercola:

Same thing. Yeah, same thing.

Dr. Scott Sherr:

Yeah. THC (tetrahydrocannabinol) does it. What people don't realize is that THC as well destroys your deep sleep. Your benzos do the same thing. Your alcohol does the same thing. And you really want to be taking things that are going to enhance your sleep stages as much as you can and not things that are going to trash it. If you're in a real bind and you've been on an insomnia run for days or weeks and months, and then you just need to sleep, this is sometimes a reason to use some of those drugs. But oftentimes, if you can just modulate the GABA system, you can really see significant benefit without having to do all that. Of course, you don't just do that. You're looking at sleep routines and stress and trying to enhance the GABA system and everything else, but it's definitely something to think about. You want to try to avoid these drugs that are going to screw with your sleep architecture as much as possible.

Dr. Joseph Mercola:

So, what type of doses, when you just use GABA by itself, have you gone up to and some of your patients didn't seem to respond to?

Dr. Scott Sherr:

I have to look at the doses. I don't have them offhand to know exactly.

Dr. Joseph Mercola:

Typically, the typical dose is like 500 milligrams (mg). And you go up to fifty-

Dr. Scott Sherr:

Yeah, I've heard people telling me like around 2,000 [mg].

Dr. Joseph Mercola:

Yeah.

Dr. Scott Sherr:

Somewhere around there, they might start getting an effect like it usually – I'm trying to remember the – like, 2,000 mg, 3,000 mg, but it takes a lot to get to the amount to get some effect there when-

Dr. Joseph Mercola:

Yeah, I wouldn't go more than 3,000 milligrams, that's 3 grams. That's a lot.

Dr. Scott Sherr:

Yeah. It's a lot.

Dr. Joseph Mercola:

But for people-

Dr. Scott Sherr:

Yeah-

Dr. Joseph Mercola:

Go ahead.

Dr. Scott Sherr:

And that's why I try to, again, focus on what are called "positive allosteric modulators of the GABA receptor. So, these are things like honokiol and valerian and kava and things that are very well-described and have a very good safety profile overall.

Dr. Joseph Mercola:

Did you use a niacin molecule attached to GABA? Nicotinamide.

Dr. Scott Sherr:

It's a vitamin B3 attached to it. I don't know the exact form of vitamin B3, but it's really great because when it goes into the brain, it hydrolyzes. And so, if you take something like N-nicotinoyl GABA, what's nice about that is that it doesn't make you so tired. The challenge with a lot of these drugs that are GABA-agonist is [they're] going to make you tired, they're going to make you – And so you might not be able to focus, for example. But if you have something like N-nicotinoyl GABA, it can get across the blood brain barrier, it can help you relax without feeling tired if you get the dosing right. So, that's the nice thing about something like that.

Vitamin B3 attached to a GABA is a really great way to increase GABA in the brain. And of course, you can synergize it with other types of compounds to make it work better. You can potentially modulate the endocannabinoid system, the system in the brain that helps with homeostatic balance. We know about cannabis now in many ways, but what we maybe don't realize is that a lot of the cannabinoids will actually affect the GABA system as well, like CBD (cannabidiol) and CBG (cannabigerol), they affect the GABA system. THC does it as well, but it

can have a paradoxical response. This is why some people that will take THC will get a lot of anxiety, actually, when they take it. It's actually doing something to the GABA receptor where you have the paradoxical response and actually have less GABA to play around with. As a result of that, you get more excitatory anxiety and things like that.

Dr. Joseph Mercola:

So, what does the CBD do with GABA?

Dr. Scott Sherr:

It modulates it, and it's a positive allosteric modulator, which means that it's going to enhance GABA. So, this is why we're using CBD at very, very high doses. There's even a company that makes this for seizures, for example, it's a pharmaceutical drug. But it's also used in clinical practice for a lot of different reasons. But really, what I think it's doing, in this case, if you have more GABA around – and I think this is important too, is that one of the main things that most of us are living now is a sympathetic life. It's a life that's just fight-or-flight all the time, and is just pounding and pounding and doesn't have any time to relax or not relaxing. And then if you have more GABA around, it's going to help you get more parasympathetic. It's going to help you with relaxation. It's going to help you with stress reduction. It's going to turn the brakes on.

But if you need to detox, you need to be in parasympathetic mode because that's how the body's going to be relaxed, and rest and digest. And also, detoxification happens during parasympathetic mode. And so, CBD is something that can help with that. It can help because it's modulating, of course, the endocannabinoid system, but at the same time, I think one of the major effects is it's because it's enhancing GABA and as a result, if you're enhancing GABA, you're going to be more parasympathetic. It's just the nature of having more GABA around.

Dr. Joseph Mercola:

Hmm, interesting. Any other helpful biohacks you found for facilitating sleep, especially in people who are prone to anxiety?

Dr. Scott Sherr:

Yeah. So, when it comes to looking at GABA, of course you can look at the supplements and the compounds that we've discussed, but there are lots of natural ways to increase GABA production. I think one of the major things that has been studied is meditation and breathwork and yoga. So, if you are getting yourself more parasympathetic, it's like a chicken before the egg, but you can do both here at the same time and kind of come up with the chicken or come up with the egg. If you learn how to relax, if you learn how to be more parasympathetic, you're going to increase GABA production. So, breathwork, mindfulness, yoga, HRV (heart rate variability) training is sort of a corresponding thing here. If you're getting yourself more parasympathetic, you are going to have more GABA around.

And GABA is really important for the maintenance of sleep. If you're in REM (rapid eye movement) sleep and you're getting chased by a monster, you stay asleep for a number of different reasons, but GABA is one of the major neurotransmitters that's preventing you [from] having these stress responses to running from the monster when you sleep. So, you want to have GABA reduction, you need to have it throughout the evening. And so, enhancing it by doing those things has actually been – what I was describing before, some mindfulness, meditation, yoga. Actually, exercise also. Exercise also helps balance out your balance between your glutamate, your excitatory neurotransmitter and GABA, your inhibitory neurotransmitter, and helps to reset that balance. So, that's really important, too. You want to be thinking about obviously having more of a lifestyle approach here at all times.

So, what I recommend for everybody is to have a sleep routine that they do every single night, no matter what, as much as possible, because if you can do this, it's like the way I always describe it, it's like Pavlov and the dog. Pavlov's dog experiment is a very simple one. You ring a bell, you bring the food out for the dog, the dog salivates. And then after a little while, you ring the bell and the dog salivates without any food there. And as a result of that, it's kind of a description of an automatic response. And so, if you can tell your body that this is an automatic response, that I'm doing these things 15 or 30 minutes before I go to bed, oftentimes that would be a really great way to get people to fall asleep.

Now, that's the falling asleep part. The staying asleep part is a little bit harder. And that's because you have people wake up at 3 o'clock in the morning and they'll be wide awake and have a very difficult time going to bed. And sometimes people will take melatonin at that point. Some people won't. I know there's controversy around melatonin as far as production, but the big thing, I think, is circadian rhythm reset and also when you're doing your exercise. And so, if you're seeing sunlight first when you wake up in the morning and trying to see in the sunset and then avoiding bright lights in the evening –

There's also controversy whether blue blockers really matter or not, but I still think that, certainly, bright lights should be avoided in the evenings if at all possible. So that's a good way to help reset your melatonin as well as your cortisol rhythms. And I've also found that if people exercise too late in the evening, that can also screw up their sleep architecture and wake them up in the middle of the night. And so, trying to work out earlier in the morning are some of the main things. And then there's lots of other sleep hacks as we know, but nothing's in a silo here, Joe, as you know.

Dr. Joseph Mercola:

Yeah, yeah.

Dr. Scott Sherr:

So, you're thinking about how you can help people right now as you're doing all these things that hopefully will help them maintain so they don't need supplementation, they don't need exogenous things, they can kind of do it all on their own.

Dr. Joseph Mercola:

Yeah, so this circadian rhythm is you want to align, as you mentioned or alluded to, you want to align your sleep time with sunrise and sunset. So, as we're recording this, this is the first weekend after the daylight savings time termination in the U.S., so it gets darker a lot earlier. So, you've mentioned waking up at 3 [a.m.]. Actually, I frequently wake up at 3 [a.m.], [inaudible 00:32:44], but I go to bed at 8 [p.m].

Dr. Scott Sherr:

Right, that's enough sleep then, yeah..

Dr. Joseph Mercola:

So, that's seven hours. And then I woke up a little earlier today. I woke up at 2 [a.m.], I think 2. Yeah, it was 2 [a.m.], but it was really 3 [a.m.] because of the time shift.

Dr. Scott Sherr:

Sure.

Dr. Joseph Mercola:

So, I did some meditation. Now, you had mentioned the breathwork and I couldn't agree more, but I'm wondering if you've looked into the reason that breathwork works. Ostensibly, it's to increase your CO2 levels. And I don't know if you studied CO2 but that is-

Dr. Scott Sherr:

I have.

Dr. Joseph Mercola:

Good, because we should dialogue about that because I've done a deep dive and with one of the leading breath experts, probably the best guy out there in the world, Dr. Peter Litchfield. And he teaches us and he actually has a device that measures your CO2 levels because you don't measure it, you're just guessing. And he's a firm believer that most breathwork teachers are doing the wrong thing because it's not about breathing mechanics. It's about kicking in automatically, autonomously and getting rid of your bad breathing habits that – you can be doing perfect Buteyko breathing. And he said a lot of practitioners, they were overbreathing all the time and had very low CO2 levels.

So, you have to be cautious with breathing because if you have these breathing habits, they're established frequently at a very early age from some type of trauma, and you have a trigger and boom, you're into it. You don't even know you're doing it. So, it takes a skilled clinician to assess these and it's not widely known, but it sounds like you're aware of that. So, I'm wondering if you can share your experience with CO2 levels and some of the strategies you mentioned, because it would seem like, to me, that the benefit of doing that is to raise your CO2 level. It's so dramatic. It increases your oxygenation in your body. And, actually, we should talk about this because you had mentioned, alluded to earlier in your intro, that you do hyperbaric oxygenation therapy,

Dr. Scott Sherr:

Right.

Dr. Joseph Mercola:

-one of the top experts out there on this. And I'm wondering – in my mind, it's almost malpractice not to use CO2 in that airflow to compensate for it.

Dr. Scott Sherr:

Well, yeah. You make some very interesting points here because, obviously, I'm an oxygen guy. I've been an oxygen guy for a decade doing hyperbaric oxygen therapy and understanding how oxygen works. And it wasn't until maybe two years ago, when I met a couple of colleagues in the space as well – let's call it the “breath space” and the “CO2 retention space,” where I truly started to understand that if I wanted oxygen to work better, I needed to make sure that I understood.

Dr. Joseph Mercola:

[inaudible 00:35:18] CO2-

Dr. Scott Sherr:

I needed to understand how CO2 was working because if you're hyperventilating, for example, you don't unbind oxygen from your red blood cells and you can't get it to your peripheral tissue because of how you shift something called your oxygen dissociation curve-

Dr. Joseph Mercola:

Well, because you're changing the pH, .

Dr. Scott Sherr:

There's a change in pH, exactly.

Dr. Joseph Mercola:

You get respiratory alkalosis.

Dr. Scott Sherr:

Exactly. So, there's something called the oxygen dissociation curve-

Dr. Joseph Mercola:

or the Bohr curve. The Bohr curve.

Dr. Scott Sherr:

Yeah. And this is a curve that shifts depending on multiple different things. The oxygen availability is one of them, CO₂ is another one. There's a multiple of things – pH in the body, it'll shift. And so, when I think about CO₂ now, I absolutely think about it as not a waste product anymore. I used to think about it as, “Oh, we just made carbon dioxide and we breathe it out.” But the challenge with that is that CO₂ has lots of other major effects, especially in the brain. And it causes vasodilation, for example.

And if you have too little CO₂, you're going to constrict blood vessels. And if you're constricting blood vessels, you're going to have a challenge with getting oxygen to the tissues that you need it. And so certainly, I think a big part of breathwork, the breathwork that's working on CO₂ tolerance, is really, really important because that's going to shift your oxygen dissociation curve. And then as a result of that, you're going to have a better parasympathetic and sympathetic balance because you're going to be more tolerant to stress overall if you have more CO₂ tolerance overall. So, I 100% agree that I think a part of what's going on with breathwork and balancing out your sympathetic and parasympathetic nervous system is CO₂ tolerance. And then by extension, I think GABA is playing a role as we have more parasympathetic balance around as well.

Dr. Joseph Mercola:

Yeah. I just recently viewed a lecture that Ray Peat gave from almost 14 years ago. And it only had 2,000 views. So virtually no one has seen this. And it was all about CO₂. And he shared some examples on how it might be the single best longevity agent of the naked mole rat. And anyone who studies longevity knows that there is [a] paradox because they're about the same size as a mouse. Mouse lives two to three years and these naked mole rats live like 30 years, it's crazy. And the speculation from Peat's perspective is that they dig these holes and then they cover the holes up and they're living in CO₂ concentrations of like 5%. And our concentration in the environment, I believe, is 0.4%. Or it used to be 0.3%, but now we've got global warming. What a joke.

Dr. Scott Sherr:

I just know about it in millimeters of mercury. I don't know it in-

Dr. Joseph Mercola:

Yeah, yeah, that's right. Because you're a hyperbaric guy.

Dr. Scott Sherr:

Yeah.

Dr. Joseph Mercola:

So, it's interesting that – and some of the speculation why it works is it actually lowers the conversion of tryptophan to serotonin.

Dr. Scott Sherr:

Hmm, I didn't know that, okay.

Dr. Joseph Mercola:

Yeah, that's one of the factors. But I'm wondering if you've explored integrating CO₂ into the oxygen? Actually, the divers have this. I think it's maybe 5% CO₂ in their oxygen mixture. It has a name – Carbonox or-

Dr. Scott Sherr:

Yeah, they have a name for it. I know what you're talking about.

Dr. Joseph Mercola:

Yeah, I just don't recall the specific name, but it's a standard mixture that you can purchase commercially if you're diving. So, I wonder-

Dr. Scott Sherr:

Yes. Yeah. So, I haven't explored CO₂ directly, like as a gas. I have used and I'm working with CO₂ tolerance with hyperbaric therapy. So, working on – there's another really cool, a little reflex – I don't know if you've heard of that. It's called the splenic contracture or dive reflex. So, what happens is that if you hold your breath for a period of time, it doesn't have to be too long, even just 30 seconds, even maybe a minute.

Dr. Joseph Mercola:

Your CO₂ will go up big time.

Dr. Scott Sherr:

Your CO2 goes up, and as a result of that, your spleen actually contracts and you get extra red blood cells and circulation because the body's trying to get you more oxygen-carrying capacity. So, I'm using that clinically-

Dr. Joseph Mercola:

Hmm. Those are reflex? It's a reflex then because-

Dr. Scott Sherr:

Yeah. Dive reflex. It's something that we were – when we were mammals in the ocean that we would have.

Dr. Joseph Mercola:

I didn't know that was a mechanism, that the spleen contracts because-

Dr. Scott Sherr:

Yeah. So, the spleen actually contracts. It's well-described.

Dr. Joseph Mercola:

Because the increased CO2 is a vasodilator, so you wouldn't think of a constriction anywhere but it's a reflex.

Dr. Scott Sherr:

Yeah, it's a reflex that happens. It comes from us being mammals in the ocean and needing more oxygen-carrying capacity. So trying to get every red blood – we have a reservoir of red blood cells in our spleen and that reservoir is emptied, or a significant amount of it is if we hold our breath, because the body's thinking, “Oh shit, we don't have any oxygen around when we have to get more red blood cells out to do the best we can to carry more.” And that's something that I've leveraged in a hyperbaric chamber, for example. So, if you have somebody do a breath hold before they go in the chamber, then they go in, they're going to have more oxygen carrying capacity when they do go in. But the big thing that I always think about, Joe, now after the last several years of talking to breath experts and doing this myself as well, is making sure people are not hyperventilating at all, making sure that they're taking slow, deep breaths and not overbreathing because if they are, they're not going to be able to unbind the oxygen that we're [crosstalk 00:42:25].

Dr. Joseph Mercola:

You're 100% correct, but it's a huge, huge problem. Because Litchfield is not only an expert in respiratory physiology and has a degree in it, but he's also an expert in behavior training, behavior analysis, and that's the whole thing. Most all of this is unconscious. They think they're

breathing slow, but a large segment of the – I cannot say it's the majority, but in many, many cases, they're breathing too deep. It's not shallow. And as a result, they're hypocapnic, their CO2 levels are in the dirt.

Dr. Scott Sherr:

Hmm. Yeah.

Dr. Joseph Mercola:

Even though they think they're doing it the right way, they go into this supposed relaxation response and their CO2 levels drop to like 20, 25. It's crazy.

Dr. Scott Sherr:

Yeah, you can do some things. I don't – I haven't worked with any CO2 monitors directly, but I know they do exist, but I know that you can look at – I look at [crosstalk 0041:14]-

Dr. Joseph Mercola:

I've got one. I play with it all the time.

Dr. Scott Sherr:

Oh, cool. Yeah.

Dr. Joseph Mercola:

It's fascinating because what I'm particularly intrigued with is [that] I had a bad breathing habit when I was working out and exercising. And when you look at the monitor, you can actually train yourself to slow the breath down. You can see your CO2 levels. I was going in like in the low 20s and now I'm in above 40 when I work out. But it's a massive conscious shift in how you're training. Because you think you're breathing heavier and more quickly, and you're getting more oxygen, but it's the exact opposite. You lower your oxygen.

Dr. Scott Sherr:

Yeah. Nasal breathing is really important, too. I think that's the other piece that people forget, is that nasal breathing is also really important when you're looking to increase oxygen carrying capacity-

Dr. Joseph Mercola:

Yeah, yeah. Ideally, yeah, but it's not necessary. You can breathe normally with your mouth. It's not ideal because you're losing the filtering, and there are other reflexes, and you dry your

mouth, and you're going to increase your risk of cavities, but you can still have normal CO2 levels with mouth-breathing.

Dr. Scott Sherr:

Yeah, I can imagine that.

Dr. Joseph Mercola:

But I would never advise it for nighttime sleeping, that's for sure.

Dr. Scott Sherr:

Right, yeah. I know that from a CO2 tolerance perspective, it's easier for nasal breathing, in general, is what I've been told overall. Especially if you're in exercise, you're able to increase your tolerance higher if you're nasal-breathing versus mouth-breathing. But, I mean-

Dr. Joseph Mercola:

Yeah, it depends on the individual-

Dr. Scott Sherr:

Sure.

Dr. Joseph Mercola:

-because the only way to do [it] is to measure it. You got to use these capnometers, and the capnometers will tell you very precisely. It's just like, you don't know what your blood pressure is, you don't know what your vitamin D level is as you measure it.

Dr. Scott Sherr:

Yes, you got to measure. I'm a big fan of – I mean, this is just in general. I agree with you a hundred percent, Joe, that you really need to be measuring things and the big things that I typically measure on the metabolomic side. So, I do a lot of testing with my own personal clients, of looking at metabolomics and looking at vitamins, minerals and nutrients, and hormones and neurotransmitters. And if you don't measure and you really don't know is what it comes down to.

Dr. Joseph Mercola:

Yeah.

Dr. Scott Sherr:

And then you have all these objective measures of thinking, looking at CO₂, for example, oxidative stress markers back to the other side. But I'm always thinking about these things on the hyperbaric side. I'm always thinking about oxidative stress levels, antioxidant reserve, energy capacity [and] vasodilatory response. These are-

Dr. Joseph Mercola:

CO₂ is one of the best ways to reduce AGEs, advanced glycation end products. And you know how it does it? It does it by binding to the protein. There's a carbonyl amino residue that has lysine as the amino acid and it binds to that. It's not covalent, it's an ionic bond, but it's like a bulletproof shield and protecting that protein from being damaged, which is why you want to have your CO₂ levels really, really high. As high as you can tolerate. In the 40s, I'm sure.

Dr. Scott Sherr:

Right, right, definitely in the 40s. You have to be a little bit careful if you have COPD (chronic obstructive pulmonary disease)-

Dr. Joseph Mercola:

Oh yeah, yeah. That's a whole different deal, right.

Dr. Scott Sherr:

-if you have obesity, hypoventilation.

Dr. Joseph Mercola:

We're assuming normal lung pathology.

Dr. Scott Sherr:

Assuming normal lung capacity.

Dr. Scott Sherr:

Lack of lung pathology.

Dr. Scott Sherr:

Yeah. I always have to be careful who's going into a hyperbaric chamber. If they have untreated severe sleep apnea, they're morbidly obese, they have COPD and they don't have a good ability to regulate their balance between CO₂ and oxygen. Because the people don't realize that what makes us breathe is not oxygen, but our CO₂ levels. And so, if you can't balance out your CO₂ and oxygen levels, you can get into trouble in a hyperbaric chamber. But that's another indicator,

Joe, as what you're saying, why CO2 is so important. We don't breathe because of lack of oxygen. We breathe because of elevated CO2.

Dr. Joseph Mercola:

Yeah, it's a stimulus and – I didn't realize this, but in most communities, the most common reason that people jump into an ambulance is because of CO2 dysfunction. The majority of people actually, in most communities, because they have a panic disorder and they think they're dying. They really – because, you know, people aren't stupid. They know [if] they jump in an ambulance, it's a big-ass bill. It could even result in bankruptcy, jumping in an ambulance.

Dr. Scott Sherr:

Right.

Dr. Joseph Mercola:

So, they're not going to be doing that frivolously, 100%. They only do it if they think their life is in jeopardy. And if they feel that, it's just a horrible feeling when you feel you can't get enough oxygen. They get trapped, and it just builds on itself and they can't get out of it.

Dr. Scott Sherr:

Yeah, right.

Dr. Joseph Mercola:

And it is a lack of oxygen, but it's because their CO2 is so low. Because the curve changes in the wrong direction. It binds tighter and the pH makes it harder to get the oxygen out of the red cell.

Dr. Scott Sherr:

Exactly. So, if you can't unbind your red blood cells with the oxygen, you're going to feel terrible. And it's interesting-

Dr. Joseph Mercola:

[inaudible 00:45:36], yeah.

Dr. Scott Sherr:

Yeah. I haven't done it, but have you ever tried holotropic breathing where you do hyperventilation for 30 minutes at a time and have a psychedelic experience? I'm wondering what the mechanism is there. You know, it's interesting.

Dr. Joseph Mercola:

Yeah, yeah, I'm not a fan of it. I mean you can definitely do it. It's certainly an alternative to some psychotropics. I just think there are other ways. I much prefer meditation to do that. It's a lot more natural.

Dr. Scott Sherr:

Right. From a day-to-day operation's perspective, certainly meditation is higher.

Dr. Joseph Mercola:

Yeah, [inaudible 00:46:05] I've been playing with my meditation, I did an hour and a half meditation this morning and-

Dr. Scott Sherr:

Yeah, I'm a big fan of meditation, too.

Dr. Joseph Mercola:

I had the capnometer on and my CO2 levels were rising. I think this is the reason why – one of the major benefits of meditation is your CO2 levels rise-

Dr. Scott Sherr:

Do you think it has something to do with –

Dr. Joseph Mercola:

-because I was running at 45 almost the whole time.

Dr. Scott Sherr:

Yeah, I wonder if it has something to do with increasing theta and delta, maybe even gamma, as far as in the brain and brain waves? Because I-

Dr. Joseph Mercola:

Yeah, because I use a meditation app, and that's exactly what it does. It's brainwave [inaudible 00:46:35], and drives into those rhythms.

Dr. Scott Sherr:

Yeah. Yeah, I'm a big fan. I teach all of my clients to meditate. I don't make it too complex for many people, but there are lots of different ways to meditate. But this is a great way for people to reset on a regular basis, to go back to the balance between your parasympathetic and sympathetic systems, and having a different perspective on all the thoughts and the things that you think you need to do, but all of them being an illusion and just watching them kind of arise and pass away.

And there's obviously lots of nice ways of doing this, and lots of different apps, and lots of different programs. But in essence, if you can just watch your mind and observe it for a little while, and see what's happening and be amazed at what comes up, and then just let it pass. There's a great Tibetan nursery rhyme that I like. It's like we are the sky and the clouds are just passing like children and you just watch them go and they just keep going and keep going. They're always going to come and always going to go. So, [that's] something that I tell my kids every night before they go to bed too, it's a nice way of reminding people. But I think that you're right. I think when people have these meditative experiences, when they have these peak experiences on meditation, there very well may be at the CO2 piece of this.

Dr. Joseph Mercola:

I'm convinced there is. There's no doubt in my mind. There's a deep, profound physiological response in combination with the brainwave rhythms. It's magic.

Dr. Scott Sherr:

Yeah, because you can change – you can change your internal temperature, which is super interesting, if you're a really amazing meditator. And I wonder if that has something to do with CO2-

Dr. Joseph Mercola:

Probably. Probably.

Dr. Scott Sherr:

That is super interesting.

Dr. Joseph Mercola:

I could play with that but-

Dr. Scott Sherr:

Yeah, you have your monks that can sit outside in zero-degree weather for hours or days, and maintain their internal temperature just with-

Dr. Joseph Mercola:

You might want to play with picking up a capnometer and playing with this [inaudible 00:48:17].

Dr. Scott Sherr:

Yeah. No, I'd like to. It's actually, it's been on my list of things. I've been look-

Dr. Joseph Mercola:

Yeah, I'll connect you with one of the best companies out there.

Dr. Scott Sherr:

Cool, yeah.

Dr. Joseph Mercola:

They're not terribly pricey as medical equipment go. It's affordable.

Dr. Scott Sherr:

Yeah, but looking at the hypoxic training as well. So, I've been looking at more of how to integrate that on the hyperbaric side a little bit, understanding the shifts that the shifts [crosstalk 00:48:37]-

Dr. Joseph Mercola:

Oh, that's great. Yeah. Thank you for reminding me because I did want to discuss that with you. I was going to do it offline, but as long as you mentioned it, we can discuss it here. What you're referring to is IHT, or in-minute hypoxic training. I have a device. They're pricey, they're tens of thousands of dollars. And I do it, but I'm actually preferring meditation more. I'm shifting because it's hard to use the capnometer in that device because you have this face mask on that gives you the oxygen at varying concentrations, like your 10,000, 12,000 feet, maybe even 15,000 feet, and cycles between that concentration, which is usually a PO₂ of 14% or so, partial pressure [of oxygen].

Dr. Scott Sherr:

Less. Less than that. Yeah, less.

Dr. Joseph Mercola:

Yeah, well, I don't want to go a lot less than that. I would not go-

Dr. Scott Sherr:

No, I know. I know. I'm just saying I live in Colorado-

Dr. Joseph Mercola:

It goes down to 9%, but it's dangerous down there.

Dr. Scott Sherr:

Yeah.

Dr. Joseph Mercola:

And then you go up to 34%, you alternate between the two and it has some profound impact. So yeah, I've been playing with it for a little bit over a year and-

Dr. Scott Sherr:

Yeah. I think there's something to it. I think that going low-oxygen is very interesting for short periods of time, if you're relatively healthy. I think if you're unhealthy, it could be a real challenge because it puts on significant stress in the system. What you're looking to do here with intermittent hypoxic training is kind of throw on that stress a little bit and then go to hyperoxia, or increase the amount of oxygen, and it kind of floods the system as the body is shifting that dissociation curve that we were talking about before. So, you're shifting it one way, in the "oh, shit" way, because you have 9% oxygen and then the red blood cells-

Dr. Joseph Mercola:

Well, hopefully not 9%.

Dr. Scott Sherr:

Yeah. You don't want – yeah. Yeah. So, in Colorado, I think we're at 5,000 feet, it's about 16% oxygen,

Dr. Joseph Mercola:

Yeah, yeah,.

Dr. Scott Sherr:

-just to give a barometer for people. And then you shift it back to hyperoxia and then your body gets excited about all that oxygen being in there and you can utilize it better as a result of flipping it back and forth. And so, we've been looking at how you can use that inside in a hyperbaric world a little bit and help with leveraging, but you have to be careful here because it is certainly something that can be very stressful on the system if you're not used to doing the intermittent hypoxia. In a hyperbaric chamber, Joe, as you know, you can use something called an air brake, which is when you're breathing oxygen at a certain pressure and then you stop breathing that amount of oxygen, just breathing the amount of oxygen in the chamber itself.

If you're at sea level, that's 21% oxygen at sea level. And then you're increasing it maybe to 90% with a mask or something like that. And when you go to 90% down to 20% or 21%, your body sees that as a relative hypoxia. This is something called the hyperoxic-hypoxic paradox. So, you can think about even just leveraging a hyperbaric chamber without even going fully hypoxic.

There are lots of different ways to play with this, but I think the main idea really is, how are you going to enhance the ability of the body to increase mitochondrial function and also mitochondrial biogenesis? That's one of the big things. And then what you're looking at there is probably recycling a lot of the mitochondria that aren't working very well. And that's what you're looking to do, one of the major things here. The stem cell release is another, angiogenesis or new blood vessels is another thing. These are all kinds of things that are involved, I think, when you're looking at that hypoxic-hyperoxic stimulus.

Dr. Joseph Mercola:

Yeah, it's a stressor for sure. And in many ways, I think the best stressor analogy we have is exercise.

Dr. Scott Sherr:

Right.

Dr. Joseph Mercola:

And just like exercise, you really do not want to do aggressive exercise every day. That is a prescription for disaster. Typically, hard workouts two or three times a week is all you need. Anything more is going to be counterproductive. So, it's kind of like the same with this. You don't want to do it that frequently. But I'm wondering if you've looked at hormonal responses to hyperbaric versus IHT. Intermittent hypoxic training. Are they pretty similar, like with the F1 alpha and other responses? And maybe you can compare the two because it's really – IHT isn't popular at all in the United States. There are very few centers that have it. It's mostly popularized in Germany and Russia, and it's just now coming to the U.S. So, it's hard to find a lot of details on it. I'm actually going to interview a Russian expert in the next few weeks to get more details, but it's sort of an enigma to me right now. I wonder if you've studied it more deeply.

Dr. Scott Sherr:

I've studied it. The challenge is there are no comparisons in the sense of I can't say that IHT is going to do x and hyperbaric therapy is going to do the same, or more or less. My general sense of this, Joe, is that intermittent hypoxic training in a hyperbaric chamber, when you're going from high amounts of oxygen to regular amounts of oxygen, that is safer for most people, especially when they're starting, because it's not going to be as much stress on the system in general. But if you're relatively healthy and you're looking to make bigger gains faster, I think that intermittent hypoxic training, as you're describing with one of these machines, is probably going to get you there faster. But there's a trade-off there.

And so, in many people that I'm first doing this work on, I'm usually thinking about if I'm going to do intermittent hypoxic training, it's going to be very mild. And what I've also realized is that you probably – this is from talking to many people in this world of intermittent hypoxic training,

and then a lot of these guys are also in the breathwork spaces. One of my friends, my friend, Brian Mackenzie, for example, he's a really great, amazing guy – is that you don't need as much of a hypoxic stimulus, really, to get the effect that you think you need. And this is still very early in understanding, but when you actually get HIF release, it's probably not as significant. You don't have to go to 9% oxygen to do that, is what it comes down to.

So, I think that you probably can get away with doing less intermittent hypoxic training and still get significant benefit, and if you're not as ready to go to the deeper pressure – the lower levels of oxygen and make the bigger gains faster. So, I think a lot of this is person-dependent, and I think it really depends on what the goals are. If you're an elite athlete, or if you're somebody that's just trying to have longevity and health span – health span first, longevity second, of course, but health span first – then I think that's going to be a different permutation where I would be thinking differently as opposed to somebody that came in and said they wanted to win an Ironman in two years or something like that.

Dr. Joseph Mercola:

Yeah, I want to put a warning here, because I realize some people might be confused what we're talking about when we say “intermittent hypoxic training,” because there's another form of that out there, ostensibly, which is like Live O2, would be an example of that, and I've had one on those but this is a totally different animal. That's a cheap substitute and essentially is a giant bag that literally might be four or five giant trash bags full of oxygen that you hold up in a plastic bag, which is not a good idea because of the phthalates and things that you're breathing in like 15 minutes. This device is much more sophisticated. First of all, the oxygen concentrator is medical-grade. It's very, very pure oxygen.

Dr. Scott Sherr:

Right. [inaudible 00:55:41].

Dr. Joseph Mercola:

The one in these Live O2s is not, it is not hospital-grade at all. And there's no sensory feedback. So, then you have a \$500 PO2 meter. This is another medical-grade pulse oximeter that's on your finger so that you set the thresholds, and if your PO2 drops below 80% or 84%, whatever you feel is the safeguard, the machine automatically kicks on so you cannot damage yourself. It's a safeguard. People that train me on it – in some ways it's like Wim Hof breathing but with all the safeguards, because it's absolutely controlled, there's no way you can get hurt if you're doing it properly. You can bypass the safeties and kill yourself. But you know, that's not a wise strategy. So, the point I wanted to make is it's a lot different than what's generally perceived as intermittent hypoxic training.

Dr. Scott Sherr:

This is with a lot more guidance and a lot more surveillance as you're doing it, absolutely. I know [the] machines you're talking about and how expensive they are as well.

Dr. Joseph Mercola:

Yeah, yeah.

Dr. Scott Sherr:

So, it's definitely another realm and yeah, I agree. We shouldn't be breathing out of plastic bags as much as we can avoid it.

Dr. Joseph Mercola:

Yeah, well, I had one of those and I stopped that many years ago. It was just – because you get exhausted, especially if you're going fast, you get exhausted. And then probably when you're using it, you probably have a bad breathing habit and you're going to lower your CO2 level. So, you think you're bringing all this great oxygen, but you're consuming it so rapidly that you're developing low CO2s and it's absolutely counterproductive. You have to be very careful. You're playing with fire and you don't even know it. That's the danger.

Dr. Scott Sherr:

Yeah, as we were discussing earlier, I think the main ways that most people can do this is learn how to learn the ways of CO2 tolerance. And there are lots of different ways of doing that. I'm sure, Joe, you have lots of recommendations there. I have some.

Dr. Joseph Mercola:

A capnometer, that's the only way to know.

Dr. Scott Sherr:

Yeah, for sure.

Dr. Joseph Mercola:

Because otherwise you're fooling yourself. So many professionals who teach this, I can't tell you the number of people who thought they were doing the right thing, trained breath professionals, and they had low CO2 levels.

Dr. Scott Sherr:

Yeah, I definitely need to check it out. Because I think what I try to do – and look, all my patients and clients that I work with, whether I'm working on their GABA system or a hyperbaric

therapy – and because for me, my whole approach is a very foundational, integrative one. I'm always looking for ways at the same time. Yeah.

Dr. Joseph Mercola:

Oh, that's a good point. You know, you were talking about metabolomics and trying to find tests. So, the latest data show that likely 95% of the population is metabolically inflexible, aka insulin resistance. So, I'm wondering if you regularly measure fasting insulin levels. That seems to be the best biomarker for insulin resistance.

Dr. Scott Sherr:

It's definitely one of the ones that I use when I'm looking at hormone optimization for my clients, I do use fasting insulin and I do the HOMA2-IR measurements as well, which is a way to calculate-

Dr. Joseph Mercola:

What is that, the HOMA2-IR? What is that?

Dr. Scott Sherr:

Yeah. It's just a way to calculate insulin resistance. It's a calculation that you can use looking at-

Dr. Joseph Mercola:

What are the variables?

Dr. Scott Sherr:

Fasting glucose and insulin level, basically.

Dr. Joseph Mercola:

Okay, okay. So, you take those two and you get another number?

Dr. Scott Sherr:

Yeah. It's just a calculation. So, you can do that-

Dr. Joseph Mercola:

So, fasting insulin by itself – and fasting insulin [test] is cheap. I mean, it's not an expensive test. You just have to fast.

Dr. Scott Sherr:

Yeah, yeah, you're right-

Dr. Joseph Mercola:

So, what are the ranges you've seen in your practice?

Dr. Scott Sherr:

You see things all over the place. And I've had even elite athletes with low insulin levels that are crazy. Actually, they become elite athletes just to maintain their insulin response because they don't have enough insulin around, which is pretty unusual, but pretty interesting. But I've seen everything from very, very low insulin to very, very high in general.

Dr. Joseph Mercola:

What's the lowest you've seen?

Dr. Scott Sherr:

I think I've seen less than – was it less than 2? I think it was 2, somewhere around there. So, usually, I think the scale goes from like zero to 13. Yeah, 3 to 13 is normal, or something like that, I think. I have to look at the exact scale but-

Dr. Joseph Mercola:

Yeah, yeah. Interestingly, it's thought that carbohydrate restriction will lower your insulin levels, right? I mean, that's conventionally believed by most physicians, I think. So, I got my carbohydrate levels up to 500 grams. And I don't recommend that for everyone because you need a fair amount. You have to have muscle mass and you have to be doing a lot of movement. Otherwise, that's going to be way too much for a lot of people. Most people need about at least half of that though. And if you're getting less, it's a problem. But my insulin – you know what? Guess my insulin level. I just did it last week, fasting [insulin].

Dr. Scott Sherr:

What was it?

Dr. Joseph Mercola:

1.4.

Dr. Scott Sherr:

That's low.

Dr. Joseph Mercola:

No insulin resistance.

Dr. Scott Sherr:

Well, that's the thing, you don't have any insulin – I mean, it's very interesting. Yeah, with that much carbohydrate floating around, it must be everything else that you're doing. But, in general, we have people that are much higher on the insulin resistance scale. And you're right, I think 95% of the population has metabolic dysfunction, which means they have mitochondrial dysfunction. And if your mitochondria aren't working, you can't think, you can't exercise, you can't do much of anything very well for a very long time.

This is why we have just an epidemic of people with brain fog, and especially in the world that we are in now, because if you don't have mitochondria that are working, you're going to see it very easily and very quickly in your brain, especially. That's where you have your [inaudible 01:00:56] outside of your muscle tissue and your heart and your liver. So, I think it's great that you're looking at that. It's definitely one of the markers I look at all the time and getting the levels.

Dr. Joseph Mercola:

Yeah, well, I think it's imperative because it's an epidemic and it really is at the core of one of the primary reasons – it's really a marker. Maybe not the cause, but it's certainly a marker.

Dr. Scott Sherr:

Yeah, yeah.

Dr. Joseph Mercola:

I used to believe it was the cause, but I was confused. I used to believe high glucose was the cause, and “No, no, it's insulin.” No, it's not insulin. It's the reason that the insulin is resistant to begin with, which has to go to the mitochondria, and the mitochondria are messed up because you're getting the wrong fuels.

Dr. Scott Sherr:

Yeah. You mentioned muscle mass too, which is a big one, right? If you don't have muscle mass, you don't have any reserves for your glucose that you're taking in from your carbohydrates. So, you need to have muscle mass to be able to have a reservoir for these things.

Dr. Joseph Mercola:

Yeah.

Dr. Scott Sherr:

If you're taking as many carbs as you did for a period of time and you don't have any muscle mass, you're going to get in trouble overall.

Dr. Joseph Mercola:

Oh, big time, because you'll have too much glucose that you can't store-

Dr. Scott Sherr:

You can't store in the muscles.

Dr. Joseph Mercola:

Yeah, [the] muscle is a sink. It's got the glucose receptors on the cell membranes. It just sucks it in.

Dr. Scott Sherr:

Right. Yeah. That's why it's really big for people, especially as they get older, to make sure they're maintaining their muscle mass and their protein intake. And a big problem with intermittent fasting, in general, is that people don't get enough protein, let alone carbohydrate restriction. And I know that there's controversy on that side and how you've changed, but in essence, I think the bigger issue is protein for most people. If they're not getting enough, they're going to get sarcopenic as they get older, which means that they're-

Dr. Joseph Mercola:

Definitely. But I think they're both a big issue. I think that, potentially, the carb restriction maybe even more so, because you're going to have chronically elevated stress hormones, glucagon, growth hormone, cortisol, epinephrine or adrenaline, that's also called [inaudible 01:02:42]. And they get what's called – there are some clinicians who call it adrenaline dominance. And interestingly, you know what some of these clinicians use to treat adrenaline dominance? Aside from getting healthy carbs on board, they use progesterone.

Dr. Scott Sherr:

Yeah, yeah, I've actually heard that.

Dr. Joseph Mercola:

Which seems to work really good as an anti-stress hormone.

Dr. Scott Sherr:

It does. Yeah. It can do that for sure. It also really works well for BPH (benign prostatic hyperplasia), if you put it as a suppository, is what I've heard as well. So-

Dr. Joseph Mercola:

Really?

Dr. Scott Sherr:

Yeah, yeah. It's interestingly enough, but then you can't get an erection. So, there's that problem, but at least you don't have a big prostate. Maybe. I don't know. There's a lot of different things here, but I think-

Dr. Joseph Mercola:

Well, you know what it goes back to – a lot of people believe that nitric oxide (NO) is so important and useful, but actually it's – I don't know what your view is, but a lot of people are looking at it as a toxin. And yeah, you need some for sure, but the primary vasodilator in the body is not nitric oxide, it's CO₂. It's carbon dioxide.

Dr. Scott Sherr:

Yeah, there's controversy there. I'm not sure where I find myself at this point, Joe. I have heard your take on this before. I know I've heard obviously the other take as well in various ways. So-

Dr. Joseph Mercola:

We need some NO. We definitely do. There's no question. It's an important modulator. It's an important signaling molecule.

Dr. Scott Sherr:

Yes, yes. And hyperbaric therapy depletes it, interestingly enough.

Dr. Joseph Mercola:

Yeah, that's good.

Dr. Scott Sherr:

So, that's why you have mild vasoconstriction when you're in the chamber. So, what I try to do actually is to mitigate that vasoconstriction, sometimes before people go in, because I do consider that from a therapeutic efficacy perspective. But, in general, I find all these arguments really interesting. I find the arguments with Ray's work-

Dr. Joseph Mercola:

[inaudible 01:04:27] discussion.

Dr. Scott Sherr:

Yeah, yeah, I love it. I think it's so great because you should always be questioning what you believe. Don't believe what you think, and everything that you think is an illusion anyway, is what I always tell my patients. So, yeah.

Dr. Joseph Mercola:

Yeah, that's true. That's true for life. That's one of my guiding principles. It's all an illusion.

Dr. Scott Sherr:

Yeah, that's why I think so many people respect your work, Joe, because you're always willing to question what you believe and change. And I think that's the way I grew up as well, as the son of a chiropractor. As I mentioned, there was never any gospel. It was like, "Whatever is the information here, this is what we go with and this is how we go." And so, right now, for me, that's the way I practice, and I've created a whole sort of foundational work that I do with clients and the work that I think about from the GABA system and parasympathetic and sympathetic and CO2 and oxygen, these are all always evolving things. And if you asked me three years ago about CO2, I'll be like, "Oh, it's a waste product."

Dr. Joseph Mercola:

Yeah, yeah, for sure.

Dr. Scott Sherr:

But now I'm like, "No, no." So this is-

Dr. Joseph Mercola:

That's a big turnaround. Now we know better.

Dr. Scott Sherr:

Yes, and that's the thing, right? And so, I-

Dr. Joseph Mercola:

No, you would have said it's the primary contributor to global warming.

Dr. Scott Sherr:

Okay. Well, that must be what you believe now, or you believed five years ago or 10 years ago, or never. I don't know.

Dr. Joseph Mercola:

All right. So, if people are intrigued with your view on how to get healthy and do it in your approaches, how would they find you?

Dr. Scott Sherr:

Yeah. So, I think probably the easiest way is my website, it's DrScottSherr.com. D-R-S-C-O-T-T-S-H-E-R-R.com. I have various other locations. There's a nonprofit that I was mentioning earlier that I'm a part of called Health Optimization Medicine and Practice, or HomeHope.org. That's an educational platform for doctors and practitioners that they're interested in learning a new framework that's not functional medicine. That's really focused on optimizing cellular health and gut health and looking at neurotransmitters and GABA and things like that. And I have a couple of other companies that make products in this space that people are interested in. They can find me on Instagram @drscottsherr. And they can find all those companies and links to those there too.

Dr. Joseph Mercola:

Well, great. Well, thanks for your work. And you keep up continuing challenging the mainstream.

Dr. Scott Sherr:

Let's do it.