[00:00:00] **Dr Mike T Nelson:** 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 muscle performance, improve body composition, and do all of it without destroying your health in a flexible framework. Today on the podcast, we've got Dr. Dan Cohen from Soltech Health, and we're talking about a crazy device I've been using since April actually to help improve sleep and also reduce stress, which is pretty crazy.

[00:00:39] So the sponsors of the podcast today, make sure you check out Tecton. If you're interested in exogenous ketones, that actually tastes pretty good. So there's about 10 grams of ketones per can, and this will put you into a state of ketosis in around 20 to 30 minutes. I use this literally yesterday when I was doing more of an extended fast, I did this I had one can before my cardio training, and then I still had some more cognitive work.

[00:01:10] via the end of the day. So I had another can after and really helps I find with cognition on days. You're just below baseline, whether that could be from a sleep, or maybe you're doing a longer period of fasting or you're doing some more moderate intense exercise. That's what I really find that they are beneficial.

[00:01:32] So check them out. I am a scientific advisor to them for full disclosure and an affiliate. So you can go to the link below uses a coupon code, Dr. Mike, and you can save some dinero there. This past week I got three different emails from different people about positive feedback and how much they're really enjoying them.

[00:01:51] So that's awesome. And then also check out the flex for so at the end of this podcast It's gonna be in a separate area. I asked dr Dan what his top four tips were for sleep and stress reduction. He actually even gave us five, which is awesome So if you want to see what that information is, if you're already on the insider newsletter list You will get it automatically.

[00:02:17] If not, you can still hop on. Go to MikeTNelson. com forward slash Flex4. That's F L E X 4. We'll have a link down below. That'll put you on to the daily insider newsletter list. And you'll get a copy of Dr. Dan's response and all the past top four flex for questions. So go to Mike T. Nelson. com forward slash flex for that's F L E X a number four.

[00:02:47] And also I wanted to disclose that this podcast is somewhat sponsored by Soltech health. So I actually purchased the device myself and I did not get a free device or anything like that. Because I wanted to test it out with

my own money, not have any obligations to it. Purchased the device in April before I went to South Padre, Texas, and brought it with me down there and I've been using it since then and overall, like we'll talk about in the podcast what Dr.

[00:03:18] Dan saw as my results from using it. It's been pretty positive. Like I do think that my recovery is better. And like we'll discuss, you don't really have to do anything extra. It's a passive device you put under your bed, and it does appear to help modulate sleep. So on this podcast with Dr. Dan from Soltech Health, we'll talk all about how is that possible?

[00:03:44] What are some of the mechanisms going on? We'll talk about HRV and different ways of doing heart rate variability in order to monitor stress, different structures of the brain that are useful to downregulate and to increase sleep, and I even ask them my wacky questions as you've probably experienced by now related to bears and hibernation and sleep.

[00:04:09] Weight control and a bunch of other stuff. So if you are interested now, make sure to check out their website sold tech health I am an affiliate for them. I decided to do that after I had a thorough Kicking of the device. So I do make some money if you decide to purchase through my link, you can use a coupon code Dr.

[00:04:29] Mike to save some money If you decide not to, that's totally up to you, but full disclosure on that. But either way, I wanted to have him on the podcast because sleep is so essential for good health recovery and you reaching your goals. Even if you decide not to purchase a device, I think you'll still get a lot of great information out of this podcast.

[00:04:54] So with no further ado, here's Dr. Dan Cohen from SolTech Health. And enjoy.

[00:05:00]

[00:05:01] **Dr Mike T Nelson:** Welcome back to the Flex DIet podcast. We're here today with Dr. Dan Cohen. How are you doing today, doctor?

[00:05:08] Very well. Good. Thank you so much for being here. I originally heard about you through our friend Thaddeus Owen from Primal Hacker.

[00:05:17] I think it was. And man, I think it was like when COVID was actually going on, he said that he heard of you guys through someone, and then you were working on a new device for sleep. And I had chatted with you and I

was down in South Padre, Texas at that point, and you were still doing some beta testing and trying to work out some of the components and everything.

[00:05:38] And then fast forward to this year. Actually purchased one of your devices to try to improve my sleep. Cause as listeners know, sleep is super important and anything we can do to improve it, I think is going to be beneficial and we'll get into all the details of the device and we'll do a little analysis on my sleep too.

[00:06:00] But why did you guys decide to create a device to help with sleep in general? Cause it seems like sleep is now the new sort of hottest like physiology topic. Also.

[00:06:13] **Dr. Dan Cohen:** Well, you're right, sleep is certainly discussed plenty in the media these days, but believe it or not our initial project was not sleep.

[00:06:23] It was stress. When I went to medical school what I was taught right away in the first year was that chronic stress either causes or worsens 75 to 90 percent of all medical illnesses. I would ask my professors, why aren't we treating stress as a primary pathology? And they had good answers.

[00:06:48] They basically said, Look, the part of the brain that regulates stress levels is deep in the middle, and it's at the base of the skull. We can't get at it directly, so there's no direct intervention there. We can't hook up electrodes. We can't treat it like, Okay. It's the pacemaker of the heart and by the same token, we can't really use drugs effectively because this is an old part of the nervous system.

[00:07:13] And as the nervous system evolved, the same neural receptors were used in other parts of the nervous system. So they became widespread. So a pharmaceutical agent to impact stress would affect so many parts of the nervous system that it would have too many side effects. So we're left with behavioral techniques.

[00:07:32] And behavioral techniques like relaxation exercises, deep breathing, meditation, they generally take so long for the user to become good enough at them so that they are effective. So, most people give up. And as a result There isn't really great treatment, and this is why we have so many chronic illnesses, because of chronic stress.

[00:07:56] So our goal was, can we approach that in a safe, non invasive way, and it took us many years to figure it out. But then we realized when we did that, we were affecting the same areas of the nervous system. That affects sleep. And so we came out with a technology that did both, but because the media is so interested in sleep, everybody looks at our technology and says, Oh, that's a sleep device.

[00:08:25] Even though it does both. Got it. And so as a theory there, you're trying to, I guess I'll use the word, downregulate certain parts of the nervous system. And if you can do that, your reduction in stress is improved. And then, like I know from working with a lot of people, I do a lot of aura analysis for the guys at Rapid Health and my own clients that, If they're very high stress, it's very hard to get into sleep, right?

[00:08:50] **Dr Mike T Nelson:** So different things to just get them to down regulate has a massive payoff in terms of sleep also. So it's that crossover between the two.

[00:08:59] **Dr. Dan Cohen:** Yes, there are obviously stress and sleep are inextricably intertwined, just like a DNA molecule, too much stress, poor sleep poor sleep adds to increasing stress.

[00:09:11] And when you talk about downregulating you're right the primary areas of the autonomic nervous system that impact sleep and stress they're really separated into two major divisions. The sympathetic, known for fight or flight, and the parasympathetic, known for rest and digest.

[00:09:34] And it, think of them like a seesaw. When one is up, the other is down. And so what you want to do for both reducing stress and improving sleep is downregulate sleep. the sympathetic, which is fight or flight, so that you're more geared towards rest and digest. And so what we had to figure out is how can we essentially support and enhance the function of the rest and digest part of the autonomic nervous system.

[00:10:10] That was the key. And there was a lot of science that had tried to understand this from a diagnostic standpoint, but has never been able to, up until now, affect it. Physiologically from a therapeutic standpoint.

[00:10:27] **Dr Mike T Nelson:** Very cool. And what part of the, you said just different structures in the brain, like what specifically are you trying to target and what is the rationale behind that?

[00:10:38] **Dr. Dan Cohen:** Okay. Essentially think about how the nervous system evolved. All right, what was, what were the first creatures on the planet that had any kind of nervous system? And it may surprise you that the first creature that really had some form of nerves was the jellyfish.

[00:10:59] And that evolved about 550 million years ago. And, think about the structure of that organism. There's a big bell at the top, and then there's tentacles. And that organism has no organs. So the outer surface is permeable. And so as it floated through the water, nutrients could just pass through that permeable barrier, and it could supply the structures that existed in a jellyfish.

[00:11:28] Which basically you had some kind of contractile mechanism to shrink the bell and that would propel the thing forward and and the nervous system was just like the nerves in your arms and legs, the peripheral nerves. Okay, so that, that was the extent of the nervous system. But then as fish evolved over the next hundred million years or so, organs began to develop.

[00:11:53] Okay. And so there was a coalescence of those peripheral nerves into a rough equivalent of a spinal cord. And then at the head of the spinal cord, because now there were organs, there needed to be control mechanisms to regulate those organs. And the equivalent of that in humans is what's called the autonomic nervous system.

[00:12:17] And that top of the spinal cord is called the brain stem. Okay, so, so fish like that have no cerebral cortex, they've got no big cerebral hemispheres, inside the head. They just have this, brainstem structure at the top of their spinal cord. And that's the area that we're trying to affect.

[00:12:39] And the first area that developed was the sympathetic part. Because it's all about survival, fight or flight. And then the parasympathetic evolved to regulate the organs and it's that parasympathetic division that we want to enhance. And you have to then look at it physiologically and say, how do you speak to the nervous system?

[00:13:04] What is its language? And its language is frequency. And so we decided to approach it. In terms of what it used to help it develop because all of the nervous system developed in the presence of the Earth's magnetic field. And so it was prone to be receptive to those influences. And so what we did is we took a a clue from a company called HeartMath.

[00:13:34] I don't know if you've heard of them. Yep. And, they did some great work in the 1970s, again on heart rate variability.

[00:13:42] **Dr Mike T Nelson:** Now, looking for resonance frequencies and breathing and how they all can impact the autonomic nervous system.

[00:13:49] **Dr. Dan Cohen:** Precisely. And they they took a nice leap forward because up until then, people were looking at the interbeat interval and just doing the standard deviation.

[00:14:01] So in other words, Like

[00:14:02] **Dr Mike T Nelson:** a time domain RMS SSD for the geeks who are listening for HRV. Is that correct? Correct.

[00:14:08] **Dr. Dan Cohen:** That is absolutely correct. Yeah. You stole my phrase time. That's exactly what I was going to say. You read my mind and what HeartMath did is they looked at that analysis and they said, you know what, there's more information.

[00:14:24] If they analyze the signal using a frequency domain analysis. So, two mathematicians by the name of Cooley and Tukey in 1965 had developed what was called the FFT, the Fourier analysis that derived content from the frequency domain. And so they adopted that methodology. And did a frequency analysis of the beat to beat intervals, and there is a lot more information to be gleaned.

[00:14:55] Unfortunately they were doing most of their studies or almost all of their studies back then on normal people, particularly young, healthy adults. And so they devised some metrics where they grouped. Small segments of that, the frequency domain, and they just divided one by the other. And that turned out to be a fine metric for young, healthy adults.

[00:15:23] But when you went and used that same metric for older people that had pathology, it fell apart. And so what we had to do is we had to expand upon that and develop some metrics that could be used across the board.

[00:15:37] **Dr Mike T Nelson:** Got it. So you're taking more of the. So for listeners, correct me if I'm wrong, if you go from the time domain to the frequency domain, mathematically, you can use the fast Fourier transform to get to that.

[00:15:49] And the frequency domain will give you like the so like if you take an average of heart rate, we get some information. If you do a variability analysis of those same intervals, you get like the next level of information status, your autonomic nervous system. And so you're saying, if we then take

that time domain data, We do an FFT, we get a frequency based information that'll also give us some more additional information.

[00:16:14] Is that correct?

[00:16:15] **Dr. Dan Cohen:** Yeah,

[00:16:16] **Dr Mike T Nelson:** It's different though, I know they're not the same thing.

[00:16:18] **Dr. Dan Cohen:** It's not the same thing, and think about it this way. You're dealing with a range of frequencies and let's look at that range for a second because I think it's instructive. The frequencies are as low as 0. 003 cycles per second in the autonomic nervous system at its lowest level.

[00:16:38] Ranging up to 0. 4 cycles per second. So it's a pretty big range, but it's very low frequency. It's below brainwaves. And what HeartMath did is they said, Let's divide this range into smaller ranges. And they divided it into three ranges. The high frequency range was from 0. 15 to 0. 4. The mid frequency, well they called it low was 0.

[00:17:05] 04 to 0. 15. And then the very low frequency was 0. 003 to 0. 04. And what they did is they ignored the very low frequency range.

[00:17:19] And they did a

[00:17:20] **Dr. Dan Cohen:** mathematical analysis just looking at the High frequency or HF band versus the low frequency or LF band. And what we did is we decided to study all the ways which you could segment and analyze.

[00:17:35] That frequency domain. And what we were able to do is select parameters that really differentiate brainstem activity from the influence of cortical activity. So when you look at an analysis like standard deviation in the time domain. You're really dealing with the overall mishmash of all of that. So it's a combination of brainstem and cortical influences.

[00:18:05] So if you're stressed, then that level is going to go higher. And so you're not getting a true measurement, and you're not able to differentiate what's coming from, the difference. And so by doing what we're doing, we're able to look at pure brainstem and then the influence that the cortex has on it.

[00:18:23] And that gives you a really good indication of As to, let's say, why you're not sleeping as deeply as you could, because let's say you're thinking, rather than letting go of those thoughts or letting go of those stresses.

[00:18:37] **Dr Mike T Nelson:** So would this, in theory, be able to use as like what you just mentioned, a differential for people who have a hard time sleeping?

[00:18:45] Right, so for example, like, you can do questionnaires and ask them, like, hey, when do you go to bed? Do you have a hard time falling asleep? Do you find your brain is still very active, versus maybe someone who wakes up during the middle of the night? Or do you find that it could be used to maybe differentially segment people and therefore get them to a better intervention that sort of matches the reason that their sleep is off?

[00:19:09] **Dr. Dan Cohen:** Yes, that's it. That's exactly correct. That's exactly what you want to do. Excuse me. When you have that analytical capability, you want to be able to say, okay, in the beginning of the night, somebody who falls asleep, if you're looking at a graph of those two curves, a good sleeper, somebody who will fall asleep right away, those curves will match up pretty nicely because again, they're not thinking.

[00:19:36] So the cortical part of it, the thinking brain is turned off and the brainstem is saying, Hey, go to sleep, go deep and the cortex, because it's off, can follow it. But if you start thinking and all of a sudden you see a separation of those two lines, then you know, Oh, they're not going to fall asleep.

[00:19:57] And sure enough, that's what they experience. These are people that complain of, I get into bed and it takes me an hour to fall asleep. And sure enough, you see that difference by the same token. There's a lot of people, particularly as we get older, where we'll wake up after three, four hours. And then again, They'll get engaged with thought, and again, there'll be that separation.

[00:20:20] So you can see exactly where they're having, what time during the night they're having these issues. It's the difference between, let's say, sleep onset insomnia and sleep maintenance insomnia. It's a good way to differentiate using these diagnostics. But unfortunately the consumer products, the wearables on the market today they only look at the time domain because the burden on the microprocessor is too great with the frequency analysis.

[00:20:49] And that reduces battery time. And so, they don't want to have to bother the user with recharging more often, and so they give up on that frequency analysis. So they don't have that data.

[00:21:02] **Dr Mike T Nelson:** And so in order to do that, you would need like some type of watch that would basically be doing the live.

[00:21:09] Processing of all that math on the watch itself, not slaving it out to the phone in order to communicate. Right. So I think you said you had to come up with kind of your own wearable that matches with the device. And I know just from talking to other developers, like Garmin in general is very stingy about processing specs.

[00:21:32] And their argument is that we want to have a really good battery life. So we can have. The processor doing all this other stuff, like chewing up our battery life.

[00:21:41] **Dr. Dan Cohen:** You're absolutely right. And we never thought we were going to have to develop our own wearable. That's the last thing we wanted to do.

[00:21:47] We were focused on the therapy and

[00:21:48] **Dr Mike T Nelson:** the ass to do,

[00:21:51] **Dr. Dan Cohen:** tell me about it. And so, and actually Garmin was the first company I called, and I talked to their engineers. And I told them what I wanted, and they said, we can't do that.

[00:22:02] **Dr Mike T Nelson:** Yeah, they said, good luck.

[00:22:04] **Dr. Dan Cohen:** And I said, wait a minute, you're engineers.

[00:22:06] Of course you could do this. If you need be, we'll write the code for you. And they said no, we know how to do it. We can't do it simply because of the reason you stated. It'll kill our battery life and they said and you're going to get the answer from every other wearable company And so we needed that for our initial research.

[00:22:25] So we said, all right, we'll just do it ourselves You know, we'll dive into the project It cost us a few years to have to develop something that

sophisticated But we needed it to understand what we were doing with our therapeutics

[00:22:42] **Dr Mike T Nelson:** And so what I think is different, I have the little, so basically a little guy that'll sit inside this little module that you charge for people on video, most people aren't on video, and then it's a little watch that you wear on your wrist, and it has the light sensors on the back.

[00:22:57] So the watch then is taking live data. It's looking at this more frequency based HRV analysis, and then it's feeding it back to we'll get into what the device is, which is like a magnet, but it's feeding it back to the device that's under your bed. And so that you actually have a closed loop, which I think is different from a lot of other therapies in general.

[00:23:21] So like I've used PEMF and things like that before, but almost all the units that I'm aware of, you just set it to whatever. Now it may run some of its own programs in the background, but that's not. On any feedback from my system. It's just executing whatever program it thinks is best where this is actually correct me if i'm wrong Changing depending upon the biofeedback that i'm getting from my body because i've got a wearable That's giving it live data all the time.

[00:23:51] **Dr. Dan Cohen:** Hey. Yeah, you know what? I couldn't have said it better. I mean you nailed it in terms of how this thing works. It is a closed loop feedback system and You The reason we have to do it that way is because not everybody operates using the same frequencies in the autonomic nervous system. If I deal with somebody who's had no trauma in their life life has been, I don't want to say easy for them.

[00:24:21] But, They don't have any anxiety syndromes, they don't have severe stressors in their life. They're going to be operating at mostly high in the parasympathetic range, okay? And if you look at the range that most people operate in terms of sleep and stress, it's about 0. 15 to about 0. 25, okay?

[00:24:47] Which seems very small. But, we operate at really small bandwidths within that range, each of us. So somebody who's had, who has very little stress is gonna be operating very close to that 0.25 range. Somebody who has PTSD, for instance, they're gonna be operating very close to 0.15, okay?

[00:25:08] And then you want to be able to hit a small bandwidth in there in of, let's say, 0.02 hertz. So, for instance, I operate from, 0.23 to 0.25. But, I work with a lot of PTSD patients who operate from 15 to 17. So if I gave them my

stimulus, which we did in the beginning, because we thought everybody operated at that level.

[00:25:33] Okay, we didn't realize that we needed to personalize, and then we were getting a group of people who had no response to our technology, and I was just baffled by that, and so we started working with them on the stress side where we can manipulate the sig, the frequency very quickly. And see in real time what was happening.

[00:25:53] And sure enough, I kept taking it lower lower. And then all of a sudden, when we got into their range where we were essentially meeting them where they were at, then they immediately had a response. And so, again, we personalized it and we ended up calling that individual's res F for resonant frequency.

[00:26:14] And so that made it even more important from a closed loop, system so that we could run through a calibration process in the beginning of use, determine what that individual's res F is, and then administer those frequencies specific to that individual. To that person, but in addition, on the sleep side, you have the same thing that is applicable because sleep involves multiple structures, and they don't all operate at the same frequency.

[00:26:47] And so we had to track exactly where they were in their sleep cycle to know what frequencies to administer at that time. So again, it's personal, it's personalizing the frequency stimulus, but per stage of sleep. So that as they were moving into deep sleep, we would give them a set of frequencies that would stimulate that area that I talked about in the brainstem.

[00:27:12] Okay. The parasympathetic division. And then as they got into deeper deep sleep, we would start to give them frequencies. That affected a little bit higher area in the nervous system called the thalamus to really, because that, there's an area there, a reticular nucleus of the thalamus that regulates consciousness and rhythmic brain activity.

[00:27:36] And when you're in deep sleep, delta sleep, you have these very slow delta waves that are occurring. And so we wanted to support those frequencies. And so we had to give them that. By the same token, we had to know when somebody woke up, let's say in the middle of the night, and then we gave them what we call back to sleep frequencies.

[00:27:57] So everything had to be operable in a closed loop feedback mechanism.

[00:28:05] **Dr Mike T Nelson:** Very cool. And we'll get into how the device works in a sec, but one of my Crazy questions are one of the side things I've been obsessed with over the years is bears and hibernation.

[00:28:16] Yeah. So

[00:28:16] **Dr Mike T Nelson:** the fact that if you're a bear, you go to sleep in the winter, which is probably not a bad idea considering I live in Minnesota and you don't really wake up that much.

[00:28:26] Yeah. They move around, they toss around a little bit. They don't do exercise. They're not in there doing jumping jacks and pushups in the middle of their hibernation. But they wake up in spring and they lose. Almost entirely fat. They have very little muscle loss. And the thought being usually is that if you were to wake up a bear during hibernation, that it would be.

[00:28:51] Very groggy, asleep, like, for researchers, we can go in there and get some readings and stuff from the bear. But what do you find out if you watch videos and talk to people who do the research, the bears have a way of doing this audible high. Like almost like a Wim Hof type breathing to increase their heart rate the time when they're actually disturbed.

[00:29:11] So they have a way of coming out of hibernation very fast and you can just watch the video and realize like, you're not going to crawl in there next to the bear and do measurements. But what to me is fascinating is in. In humans, like, we do bed rest studies, we lose a ton of muscle mass, we have a lot of people who have a hard time sleeping for a night, much less months on end.

[00:29:32] But my question to all this is there any overlap between, like, hibernation or torpor or these different states animals go into versus humans? Because my thought is, Could we do like a semi, air quote, hibernation at night to get into that super low delta, deep wave, whatever we want to call it? Would that be more regenerative, or would you just not want to wake up in the morning and you're groggy for like the first four hours of the day?

[00:30:02] **Dr. Dan Cohen:** Yeah good questions. I know there's a lot of

[00:30:04] **Dr Mike T Nelson:** stuff there.

[00:30:05] **Dr. Dan Cohen:** Yeah, there is. And the hibernation mechanism essentially is a turn off of the circadian rhythm.

[00:30:13] **Dr Mike T Nelson:** Right, this is like disconnected.

[00:30:15] **Dr. Dan Cohen:** Yeah, so essentially you've lost that.

[00:30:18] **Dr Mike T Nelson:** Yep.

[00:30:19] **Dr. Dan Cohen:** And you're right, they, you gotta ask yourself the question, Why do they lose body fat?

[00:30:26] Okay. And it's really interesting. Let me tell you a little personal story. I had lost most of my deep sleep, my delta sleep and everybody does. We lose it as we age. And that really impacted My sleep overall. I was down to just three to four hours a night. I couldn't get back to sleep. It was a lot of caffeine, naps, etc.

[00:30:47] Because, that's just too little sleep. That's really unhealthy.

[00:30:49] **Dr Mike T Nelson:** Yeah, it's super low.

[00:30:51] **Dr. Dan Cohen:** And, as I started to use The various prototypes that we were developing, starting about four or five years ago, my sleep started to get better and better, especially as the technology improved.

[00:31:02] And then all of a sudden, I was getting, good Delta sleep at night, more like, a 30 year old, I'm 72 at this point. And all of a sudden, I, I've never had to diet in my life. But like my father, in my 60s, I developed a nice potbelly, and it was just all fat, and All of a sudden, I, I would at dinner, I would take the same amount of food, I would put the food on my plate, but got done eating and half of the food would still be on my plate and I would dump it into the trash and I'd say, God, what is happening?

[00:31:40] I'm just not, hungry anymore. And over the course of about six weeks. I peeled off 25 pounds.

[00:31:49] **Dr Mike T Nelson:** Wow, that's crazy.

[00:31:50] **Dr. Dan Cohen:** I totally, yeah, not trying to. But my pot belly went away. I lost all the fat. And it was exactly what you said. When the bear goes into hibernation, it's that deep delta sleep.

[00:32:05] And I had, I was achieving those levels. of deep delta sleep and what happens when we have that level of sleep? That's when, we talked about sympathetic and parasympathetic division. There's that enteric division that regulates what's happening in your gut, alright? And it regulates the hormones ghrelin and leptin.

[00:32:30] And when parasympathetic is very active, hyperactive, like in hibernation, It turns off ghrelin, and ghrelin normally says it's time to eat, all right, and what it does is instead it makes leptin overactive, and leptin comes from fat cells, and what leptin says is, I've gotten enough nutrients, don't send me any more, I'll use what I have, and that's why bears lose all their fat, and that's exactly what was happening to me, at that point I was about 70 years old and all of a sudden my body weight achieved the level that I had in high school.

[00:33:16] So again, losing all the fat and that's purely a result. Of deep Delta sleep.

[00:33:24] **Dr Mike T Nelson:** That's super cool. And that, that matches the study. So, physiology, I always like, and I'm sure you do the same thing of, okay, if we go this direction, what happens when we go the other direction? Right. So classic studies on, if this is something that increases sympathetic tone via beta adrenergic response, Hey, what if we give them a beta blocker, can we abolish this response?

[00:33:46] And then that. Gives us further information that, okay, we were probably right with the activation and that matches the opposite research that shows if you sleep deprived people, even healthy people for a long enough period of time, their food choice of what they pick as foods generally doesn't get better.

[00:34:01] It gets worse. They tend to actually eat more, even though they are actually more active. So both of those kind of sides of the coin match up with each other, which usually means like, it's probably like a real mechanism going on.

[00:34:14] **Dr. Dan Cohen:** Oh, absolutely. And it really relates to leptin and ghrelin as the key drivers.

[00:34:20] And so you don't sleep enough, you're sleep deprived, ghrelin is saying eat more, and you're right. We end up choosing things that are, much higher in carbohydrates, quick snacks, sugar, and that immediately turns into

fat. And so, you end up with this vicious cycle and that's in part why, you've got growing incidents of obesity and diabetes, in developed countries.

[00:34:46] **Dr Mike T Nelson:** Yeah. So how does the device actually work? So for listeners, it's I don't want to say it's a moderate size thing that I just stuck under my bed at night. You don't really see it. And I believe when I was talking to you about it, you said that you're actually using more of like you talked about the earth's magnetic field, that you're using more permanent magnets and not necessarily like my follow up question is, how is it different from some like PEMF devices?

[00:35:12] I believe they're, what you're doing is different than that from an execution and a theory standpoint.

[00:35:20] **Dr. Dan Cohen:** Yeah, there's a couple levels here to, to your question. One is most people don't realize there's a difference between the magnetism associated with electrical currents. Okay, so, so when you send a, an electrical current down a wire, then there's a magnetic field that surrounds that wire.

[00:35:42] **Dr Mike T Nelson:** So the right hand old school B field we used to call it an engineering school.

[00:35:47] **Dr. Dan Cohen:** Precisely. Okay. And we understand that very well and we understand the force carrier and it's the photon. Okay. So the photon is the force carrier of electromagnetic energy. What is the force carrier in an earth magnet?

[00:36:07] **Dr Mike T Nelson:** The electrons? I don't know, actually.

[00:36:09] **Dr. Dan Cohen:** Well, you're in good company. Nobody knows.

[00:36:12] **Dr Mike T Nelson:** Oh,

[00:36:12] okay. I have no idea.

[00:36:16] **Dr. Dan Cohen:** Science calls it the virtual photon because it's never been discovered. So you're not even dealing with the same type of energy. Nobody knows what that energy really is. Number one. Number two, gets back to Ohm's Law, in physics, current equals voltage divided by resistance.

[00:36:35] Remember, the frequency ranges we were just talking about in the autonomic nervous system are very low, okay? Less than half a hertz. Well, when you get to less than eight hertz, Okay, which is much higher. That's the beginning of the alpha waves, in brain waves Ohm's law says that, current equals voltage divided by resistance, but under eight hertz resistance drops to zero.

[00:36:59] So current goes to infinity and your equipment melts. Okay, so you can't provide a pure. Sine wave at that level. So the way PEMF works is they use a much higher frequency and then they amplitude modulate that. To give you the low an envelope that is lower, but you still have the fast frequencies, excuse me, in that envelope, and you're trying to interface that energy and those frequencies with a chemical system, and that's the rub, because to make nerves work.

[00:37:39] And a nerve transmit a signal, you have to move sodium and potassium ions, which are positively charged through sodium and potassium channels, which is essentially a molecule that throughout that molecule, there's both positive and negative charges. So, because we're going, we're having a fast frequency.

[00:38:00] In that electromagnetic signal, you end up having this jitter effect, which reduces the transfer of these ions into and out of nerve cells, so you don't get the same level of conductivity that you would get if you could just provide that pure low frequency. That's why we decided we ha, we couldn't do what we wanted to do with electromagnetism, with PEMF.

[00:38:27] We had to actually. Resort to earth magnets that we could just spin at these very low frequencies, which was exactly what the nervous system evolved from the nervous system was used to getting these low frequencies, not these fast frequencies that were amplitude modulated. And so instead the earth's magnetic core just gives you these low frequencies.

[00:38:53] And that's how neurons learned how to talk and conduct. So, so that's the one part of it. The other part is, you have to give it the right frequencies to affect the right structures.

[00:39:09] So that was really key.

[00:39:11] **Dr Mike T Nelson:** So is that similar to, like, people talk about the Schumann frequencies and Schumann resonance, is that similar ideas?

[00:39:19] **Dr. Dan Cohen:** It is, it's similar ideas, but that frequency, if I remember correctly, is like 7. 86. Hertz. So you're at the low alpha level. And that's just, that's a limited way of looking at the earth's frequency.

[00:39:32] And it depends. And that's really calculated from ground level earth to the ionosphere, so that's the frequency that you would get if you were bouncing light back and forth, or magnetism back and forth. Through, that spectrum of or that level of distance.

[00:39:53] Okay. So that's 7. 86 Hertz. We're not dealing with that kind of thing. At the surface of the earth where we live. Well, the earth puts out a spectrum of frequencies and what we're doing with our technology is we're supplementing the magnetic field around you to bias that field in terms of concentration of frequencies to affect certain parts of the nervous system.

[00:40:22] **Dr Mike T Nelson:** Got it. So you're trying to get more of the parasympathetic response and then you can modulate that because you've got the live. Feedback from HRV and other biometrics from the individual. So then you can customize it per each person per night.

[00:40:38] **Dr. Dan Cohen:** That's precisely what we're doing. So again, it's supporting and enhancing that particular function, like you said before, to downregulate the sympathetic and increase the parasympathetic.

[00:40:52] **Dr Mike T Nelson:** Very cool. And it might be cool if you want to talk about the data that I've gathered from the device and kind of what you're collecting, what do you display and, things I. Should be doing maybe shouldn't be doing. I think that might be a useful thing for listeners to try to get an idea.

[00:41:10] What's going on?

[00:41:12] **Dr. Dan Cohen:** Okay. Excuse me. First, I would like to say that each of us loses deep sleep as we age. And what's surprising is, That we start losing that deep sleep beginning in adolescence. Really? Wow. Yeah. Okay. And that's a real problem. Some would argue that's the ticking time bomb, to death.

[00:41:39] Because as you lose delta sleep you get more illnesses, essentially, because Delta sleep is the important stage of sleep from a physical standpoint. All right. It causes cell repair, cell regeneration, even DNA repair. It has a dramatic effect on the immune system. And so it helps prevent all sorts of illnesses like infection.

[00:42:08] Even cancer it has an effect on the brain in terms of reducing beta amyloid plaque It regulates the endocrine system, you can just go on and on it affects things like Dietary habits obesity, diabetes so so imagine as you lose Delta sleep the prevalence of all of these illnesses go up and it's Well, ultimately what happens?

[00:42:35] We die from one or several of them. So, so the natural path is even by your mid to late 40s, you've already lost 60 to 70 percent of your Delta sleep. So is it any wonder that, things start to degrade? As an athlete, what's going to happen is You know, you're going to lose muscle mass because it's harder to regenerate that you're going to have a lot more difficult time with recovery, the next day after a strenuous workout.

[00:43:09] So, all of those things are impacted at a very basic level as you get older. That's why you see these peak performers, they're in their twenties, even by the time they hit, thirty and above their level of performance, is reduced. At least on a physical level, they may make up for it with better decision making at a mental level, but that only takes you so far.

[00:43:32] As you understand better than I, in terms of physical performance. So, so when you look at our system we didn't realize in the beginning that we would actually be able to restore. Deep sleep. Okay. We again, this was a stress project. And what surprised us is, we came to understand what are the frequencies that impacted Delta sleep.

[00:43:57] And we were very surprised that after a few months, we started to see changes in terms of deepening sleep. And all of non REM. So not just Delta, but light sleep. So even before the Delta sleep starts to increase, we started to see a deepening of light sleep because light sleep half your sleep is light sleep and then best case 25 percent of it is deep sleep typically.

[00:44:23] Okay. So in your pattern, for instance. Your non REM sleep and you're not, which includes light sleep and deep sleep that started to improve first. Okay, which is exactly what you would expect. And, this is what we've seen from hundreds of other people. They, that's the first indicator.

[00:44:43] And then you start to see some of that light sleep transitions to deep sleep. And that's these are the guidelines that have been set up by the sleep society. So there's like a threshold, and if you were looking at your EEG, if 20% Of a 30 second period so six seconds had delta waves then they would say, okay, that's delta sleep That's the earliest level of delta sleep if it had 19 Sorry, it's still light sleep.

[00:45:11] Yeah

[00:45:12] **Dr. Dan Cohen:** And part of the thing that used to drive me crazy because in my last company we pioneered the automation of sleep diagnostics for sleep labs we got into that field in 1985, we were the first to do it. At that time, there were only 300 sleep labs. Ten years later, we grew that field to 3, 000 sleep labs because instead of taking four hours for a technician to analyze the recordings, we could do it in a minute.

[00:45:38] Okay, so it allowed for the expansion. And, but what drove me crazy was they looked at non REM sleep, late sleep and deep sleep, and they wouldn't, they refused to accept A quantitative measurement that would tell you the overall depth because they were so stuck on the threshold differentiation between light sleep and deep sleep and light sleep had such a broad range of characteristics It was almost delta at the low end to just drowsiness Just drifting into sleep.

[00:46:10] Well, you know yourself if you spent all night just being drowsy You would feel a whole lot different than if your light sleep was almost at the delta level

[00:46:21] **Dr Mike T Nelson:** Oh yeah.

[00:46:22] **Dr. Dan Cohen:** Okay. So that's a metric that we look at and that's what we see improve first. And then as more of your light sleep deepens, then your Delta sleep starts.

[00:46:36] Okay. And what thrilled us was if you use, if you just keep using the device and for somebody like me, it probably took a year and a half. I now have on average an hour and 35 minutes. Of delta sleep at night and about a third of that is deep delta. Oh, that's really good Yeah, and the sleep society is 50 of that 32nd period is delta waves Right.

[00:47:06] So, so I have that much Delta sleep now. That's the level of Delta sleep that a 25 year old gets. Okay. And so that's dramatic. We didn't realize that we were going to end up restoring that. We didn't realize that. I think we're going to restore it at all. We thought we were just going to enhance sleep.

[00:47:26] But that's what happened. And I guess I shouldn't have been that surprised because for the past 30 years science has realized that the brain is more dynamic. It's something called neuroplasticity. And if you start using

certain aspects of the brain, which we support, then you're going to grow new circuits.

[00:47:44] And that's exactly what's happening. We're restoring the circuits that you lose as you age. In terms of Delta sleep. And so that turned out to be a big plus your Delta is beginning to improve at this point because your non REM quality has gotten sufficiently better so that some of your light sleep.

[00:48:06] It's turned into Delta. Now, you still have a ways to go because it hasn't improved that much yet, but because we already see that your sleep is improving to the extent it is, we know you can achieve the Delta sleep that you had when you were 20. It's just a matter of time and the beauty is, not much work involved, all you do is press a button, and

[00:48:31] **Dr Mike T Nelson:** Yeah, it's all completely passive, so I'm not doing anything with it, I put the little watch on, I hit a button on my phone I go to sleep, which is the beauty of passive therapy, is you don't have to do anything else.

[00:48:43] **Dr. Dan Cohen:** Precisely. And so you get a lot of benefit for very little effort. And what we've seen as a result of that is you get the benefits of Delta sleep, which is, lower infections. I haven't had a cold in six years, I've maintained my high school weight now and I don't, I'm really bad about diet.

[00:49:05] Okay. I should be a lot better at this point. It's working for me. So, I'm just going to keep doing what I'm doing. But the other thing is my cellular regeneration is better. I won't discuss some of the other positives, but you might imagine what they're like, so all of that stuff gets restored.

[00:49:29] Which is a huge plus and, getting back to the device you put under your bed. What we have is we've got two magnets in there. Spinning at slightly different rates. One's moving up, one moving down in terms of frequency to cover your specific range and each magnet is surrounded by an aluminum tube to direct the magnetic field.

[00:49:52] That tube is broken up into two pieces, and there's wires coming from each of those pieces to a connector that's programmable on the PC board. So we can add in some cortical frequencies that supports the back to sleep frequencies that affect Delta sleep as well. So it's a the brains of the operation are in the wearable.

[00:50:13] But the star of the show is really the magnetic generator 'cause that's what's supplying the therapeutic benefit. Very cool. And on, on mine, it looks like my rem sleep is normally pretty high. Is that normal? And would you expect that to transition or change over time or is it more that light sleep gets more converted to deep sleep?

[00:50:38] Yeah, good question. REM sleep tends not to change much during our lifespan. So, I wouldn't expect that to change. That will change more related to how stressful a day you had. Okay? The more stress you have, typically, the more REM you need. And the reason for that is, REM sleep is vital for emotional health.

[00:51:02] And it's and memory consolidation. So, if you had a bad day, you're gonna spend more time dreaming about, even though you may not be aware of it, what happened during that time. And how that's going to affect your memories and your responses over time. So, so that's really the importance of REM sleep, but again, that stays relatively stable.

[00:51:25] What worsens is not just the lack of Delta sleep, but when you don't have Delta sleep, the drive to stay asleep is less. And so your sleep becomes more fragmented and you still have, you're at an age now where you're at a point where you're going to start to see more fragmentation and you do have that in your sleep pattern.

[00:51:45] But because you were already showing the signs of increased Delta sleep, that fragmentation will diminish over time. The other thing that will come back is, remember we touched on, circadian rhythm. And that's a daytime phenomenon. So that's a, that's like a cycle that's 24 hours, 15 minutes.

[00:52:04] All right. And that just differentiates night from day. And when you're more likely to go to sleep within that circadian rhythm, there are what's called ultradian rhythms. So they're shorter. And one of those types of rhythms is called your sleep cycle. And on average, a sleep cycle is about 90 minutes.

[00:52:25] It ranges from 70 to 110 minutes. Okay. And when we hit our 40s. We start to lose the differentiation into nice, cyclic sleep patterns, and a sleep pattern typically goes from light sleep to deep sleep, back up to REM, and then back to light sleep, to deep sleep, back up to REM, and the first half of the night, you get most of your delta sleep, and in the back half of the night, You get more of your REM sleep.

[00:53:01] Okay. So that's how a sleep cycles are essentially, divided into these roughly 90 minute periods, but there's a slight shift in terms of REM and Delta within earlier versus later stages, right? So your sleep pattern right now, you've got clear evidence that cyclicality is there because your REM sleep is preserved and that's happening roughly every 90 minutes.

[00:53:27] Okay, but what's not happening to the extent that you'd like to see, if you were 20 was the cycling of the deep sleep. Okay. But as you regain more of your deep sleep, then you will see that cycling appear there and then it will look more and more like a cycle of a 20 year old. Okay, now for me at my age, it took four years for my cycling to look like a 20

[00:53:56] year old.

[00:53:57] **Dr. Dan Cohen:** Okay, but I was, I never thought I'd ever see that again. Because that's what in 20 year olds. But again, that's the restorative nature of what we have here. And I have no doubt given, the progress you've already made in a relatively short time, you're going to get there.

[00:54:17] **Dr Mike T Nelson:** Very cool. A couple more questions.

[00:54:19] We wrap up like if that phenomenon is more based on neuroplastic responses coupled with the device. Is there things you can do to expedient? Like I'm thinking of things that increase neuroplasticity. We know aerobic exercises and that mainly increases neuroplasticity, hippocampal volume. Maybe things like Lion's Mane, some psychedelics to do.

[00:54:44] Are there other things that may speed along that process that could increase the neuroplasticity and then the device can drive it faster to a better result?

[00:54:56] **Dr. Dan Cohen:** Yeah, I think one of the most natural assisters in that way is exercise. Sure. You mentioned aerobic exercise definitely the case, but I think exercise that produces, more muscle mass also.

[00:55:09] Yep, and a lot of

[00:55:10] **Dr Mike T Nelson:** newer data on that too, that agrees with that.

[00:55:12] **Dr. Dan Cohen:** Yeah. And so, it's interesting because a lot of our customers will come back to me and they'll say, I'm getting a lot more deep

sleep, it's not consistent. So one night i'll get deep sleep and the next night I won't get as much Why is that?

[00:55:26] I want it. I want that every night And I say well, I said you can get it every night. I said if you act like you were when you were 20

[00:55:34] Yeah

[00:55:35] **Dr. Dan Cohen:** I said are you as active now at 60 as you were when you were 20 and they go no I said well, that's the difference. I said so you're gonna you're gonna get rebound When you get a night of good Delta sleep, if you don't do any exercise the next day, that Delta sleep is going to fall off because it responds to what your body needs.

[00:55:53] When you start using those muscles, it's saying to the brain, Hey, you know what I'm damaging some of these muscle cells, some of them need to be regenerated. Some of them, I need some additional new cells because I'm stressing my body. So, what the brain does is say, okay, fine, I'll give you more deep sleep because that's what deep sleep does.

[00:56:13] So it's again, it's that internal feedback loop that's not happening. If you're not doing the same patterns that you did when you were younger, which is okay. It's just understand what's going to happen. You don't have to be like a 20 year old when you're 60. Anyway,

[00:56:28] **Dr Mike T Nelson:** gotcha. And on this, do you also have a feature for naps that you talked about? This was originally for stress reduction. For someone who let's say is using this for athletic performance. So one of the things I've done with athletes and myself when I have time, although I haven't been able to do this recently is if they can take in a nap after their training session, the thought being maybe we can get some consolidation of the motor patterns.

[00:56:55] Maybe we can get back to a. parasympathetic downregulated state faster from them being upregulated from training. Your thoughts, is that useful? And then tell us about the napping feature on the device because you have ability to change some sensitivity on it.

[00:57:14] **Dr. Dan Cohen:** Yeah, and actually we have an update that'll come in the next month or two which will break up that relaxation part of the app into five segments.

[00:57:22] **Dr Mike T Nelson:** Oh, very cool.

[00:57:23] **Dr. Dan Cohen:** Yeah, and you'll see templates for each, but you can modify those templates. And so you'll have one for relaxation, one for what we call gentle nap, one for power nap, one for meditation, And then we may release one we're doing testing on it now, we call it Magnetic Coffee. Oh, nice. Okay.

[00:57:44] So, regarding naps, I think it's important to realize what you don't want to do is you don't want to take a nap in the afternoon because you don't want to disrupt

[00:57:54] **Dr Mike T Nelson:** your sleep time at night either, which I've seen people do that also.

[00:57:58] **Dr. Dan Cohen:** Exactly. Exactly. And you get the same problem, particularly with older people who fall asleep on the couch and then try to get to sleep in their bed.

[00:58:06] **Dr Mike T Nelson:** Right.

[00:58:07] **Dr. Dan Cohen:** Okay. So, so it's important, I think from a non disruptive element to, if you're going to take a nap and you're going to exercise in the morning, take the nap in the morning after you exercise to the extent you can fall back to sleep. Otherwise, if you're younger and healthy enough, I would probably leave the naps out,

[00:58:27] **Dr Mike T Nelson:** got it.

[00:58:31] Awesome. Well, thank you so much for all the information. Where can people find out more about the device and all the great stuff you guys got going on there?

[00:58:41] **Dr. Dan Cohen:** Yeah, I think the best thing we've got an awful lot of information on the website, and there's a lot of content there to read about sleep and stress.

[00:58:49] And so I would highly recommend visiting the site and going through it carefully. The site is soultechhealth. com and I'll spell it because a lot of people misspell it. It's S O L T E C. And then health. So, S O L T E C H E A L T H dot com. And the product is described fully on the site. There's a lot of blogs about sleep.

[00:59:19] There's videos there to review. And it can be ordered, right there on that website. So, I think that's the best way.

[00:59:29] **Dr Mike T Nelson:** Awesome. Yeah, we'll definitely put links and everything to that. Thanks, everyone. Thank you guys so much for all the information and all the technology and help solving obviously a major issue.

[00:59:39] And like I said, it's nice that it's a passive device too, like, I would say doing things where you have to actively move have a huge payoff. But if people are super busy, one of the justifications all the time is, well, I just don't have time. Well, this kind of solves the time issue too, which is great.

[00:59:56] So you get the benefit without having to add more time, which there's not a lot of things that do that. So that's awesome.

[01:00:02] **Dr. Dan Cohen:** Yeah. Yeah. Well, thank you for having me, Mike.

[01:00:05] **Dr Mike T Nelson:** Yeah, no problem. Thank you so much.

[01:00:11]

[01:00:12] **Dr Mike T Nelson:** Thank you so much for listening to the podcast. A huge thanks to Dr. Dan for all of his great work there and coming on the podcast, answering all my questions about the device really appreciate it. And as I mentioned here in the podcast, it's pretty cool that it's a closed loop system, so it's looking at your own biofeedback and making adjustments based on that which is super interesting and innovative.

[01:00:39] As I mentioned, I do really enjoy the device. I'm excited to give it another, six months to a year to see how it continues to improve. But I feel like my recovery is better now than it has been in quite some time. Even after the past couple of weeks where due to travel and everything else, I haven't been able to do as much cardio as normal.

[01:01:00] Again, it's always hard to say which device or which thing is most responsible. I've tried to only test one or two other things during this time. So again, it's a net of one, can't always rule everything out, but so far I've been pretty impressed with the device and I test a whole bunch of stuff and not a lot of things move the needle as much as I would like.

[01:01:22] And not many things six months later, I'm still using. So if you have any questions on the device, you can feel free to hit me up, go to the link below.

It is an affiliate link. So use the code Dr. Mike. You will save some dinero at checkout there. And thank you so much to Dr. Dan and all the Soltech guys for their help.

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[01:02:57] Thank you so much as always for listening. Have a wonderful day.

[01:03:01] You suppose they have any life on other planets? What do you care? You don't have any life on this one!

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