

Radio Announcer: Bullet Proof Radio, a state of high performance.

Dave: You're listening to Bullet Proof Radio with Dave Asprey. You're going to love today's episode, because we're talking to a leading neuroscientist about how to actually replace drugs with electricity, and how to make your brain more neuroplastic using new technology that you really couldn't get any other way until this just came out. When you listen through to the end, you're going to get a coupon code, which is going to save you \$250.00 off the normal retail price for a pair of headphones that looks like normal headphones, but uses electricity to change the way your body learns, which is awesome.

Today's cool fact of the day is that scientist's just came up with a new material that uses energy from ambient light to kill all sorts of bacteria, including super bugs in hospitals. This is cool because the world's changing. Chemists at the University College, London developed a polymer based material, basically that means plastic, that doesn't require hospitals to spritz it with water or anything else. They literally just turn on the lights. The reason this works is because they embedded nano particles called quantum dots and particles of a purple dye called crystal violet. When the quantum dots absorb the ambient light, they transfer that energy to nearby dye particles, which causes the crystal violet to release high energy oxygen molecules to kill microbes. That is just cool. Imagine the day when your phone is covered with that so it won't be covered with whatever it's covered with right now.

Today's guest is Dr. Daniel Chao, a neuroscientist and entrepreneur who works with technology that improves brain performance. I don't mean just normal technology, like nootropics or something. We're talking about electricity over the brain. He's had a career working with this, and today is the founder of Halo Neurosciences.

This is a topic that's been of interest to me for a very long time, because 20 years ago I read about the fact that Russian astronauts did something fantastic. They said, "You know, it's expensive to put an astronaut in orbit. So, we waste about a third of the time there in space by having them sleep. What if we could just have them sleep less?" They figured out they could run electrical current over the brains of astronauts, and they could sleep less, which means they would get more active hours in orbit, and everybody wins.

I bought one of those machines. I have been running electricity over my brain on and off for 20 years. It totally works. But, the technology's evolved. And, frankly, it's always made me look kind of like a creep. It's oftentimes made me feel a little bit odd. Now, there is new technology from Halo that actually looks normal, because it's a headphones, and actually works, which is kind of cool, too, 'cause not all the stuff that I did always worked.

We're going to interview Daniel today. You're gonna hear some things about what's going on inside your head and the new frontiers of learning. So, Dan, welcome to the show.

Dan: Thanks for having me, Dave.

Dave: There are a lot of neuroscientists out there. In fact, it just seems like you guys are growing out from underneath every bush these days. But, not a lot of them are running electricity over the brain, and certainly, very few have been doing it for as long as you have. What got you into electricity in the brain and learning?

Dan: Yeah, Dave, it goes back to medical school. I remember this class called pharmacology, which is a very important class. We're marching through the different classes of drugs, like antibiotics, drugs for cholesterol, drugs for diabetes. It didn't take me long to realize that drugs is what ... When people say the miracle of modern medicine, they're really talking about drugs.

Dave: Yeah.

Dan: Incredible. But then, when you talk about drugs for the brain, so psychiatric and neurologic conditions, the wheels kind of come off. The list of side effects are often as bad as the disease it's trying to treat. So, it really, to me, begged the question, could we be doing something better? Let's think beyond drugs.

It got me starting to think about electricity. The brain, we've long known, is computer circuit, right? It's wired and it's got different processing centers. There's cables going the processing centers. I really started to think about the brain as a computer chip, and what we could do with electricity to interface with the brain to treat human disease, and potentially to enhance otherwise healthy people.

What started as an idea in medical school led to a series of companies. We're gonna be talking about Halo Neuroscience today. But, my last company was also a brain stimulation company. There, we developed a technology to treat epilepsy. This was a big project. It's an implanted neurostimulation system involving electrodes surgically implanted in the brain with a pulse generator implanted in the skull, so, very invasive technology, and only reserved for the very ill.

Dave: So, you've been making cyborgs for a while.

Dan: Well, we try not to use the word cyborgs, but yes. These are brain computer interfaces. Drugs for epilepsy, they don't work. They don't work very well. What we did, is we came around with a technology that uses, basically, electricity as medicine, with far more efficacious results that led to the idea around Halo, where ... What if we can take the powers of neurostimulation and build them into what we call a non-invasive form factor, sort of a wearable form factor?

Dave: Are people still doing the neuropace implantable technology? Is that still on the market?

Dan: Yeah, FDA approved. It is out there helping thousands of people with epilepsy.

Dave: I wish that would've come out sooner. When I was growing up, my mom had epilepsy. She was on really heavy doses of epilepsy drugs. That stuff is not really good for you. She ended up having brain surgery at your Alma Mater at Stanford. The seizures are less than they were, but brain surgery's a pretty big, invasive procedure. In fact, I think what they did is was way more invasive than implanting a couple of electrodes.

So, it's fascinating to think about all of the toxicity of those drugs, which I've dealt with in my family. What happens when you say, "Well, wait a minute. If the drugs are ultimately affecting you electrically, what if you just went all the way down the path?" You kind of cut your teeth by going inside the brain and doing a really, just an advanced technology to solve a problem, which is what most of medicine does. We have to cure this disease.

But, with Halo now, you've gone a step longer and said, "We're not actually curing a disease here. We're doing something different, which isn't necessarily medical, because when you're increasing performance in someone who isn't sick, all of a sudden, that's not what doctors do. That's what someone else does." What's the name for that someone else?

Dan: I don't know if there is a name. Yeah, 'cause-

Dave: Bio-hacker, I don't know.

Dan: No, I think, in America, we're really good at fixing problems. Like, you have a disease, let's fix it. But what if, for the rest of us, who are otherwise healthy, what can we do to get more out of our bodies and our brains? Maybe there should be a name for it. Maybe it's bio-hacker. I don't know.

Dave: I couldn't find a name. I sort of made one up. Bio-hacking is that art and science have changed the environment around you and inside of you. So, they have control of your own biology. That means if you're not sick, and wanna be better, that's just control. But, what we're doing here is, we're changing the electrical environment on the surface of your scalp with really small amounts of electricity. What does it actually do when you run a little bit of electricity through the brain?

For people that are listening going, "Oh my God." They're imagining 1960s horror shows with smoking electrodes coming off your head. But, that's not at all the type of electricity. So just kind of walk me through the technology. What does this do? How much electricity are we talking about? Give me a picture of it.

Dan: The core technology that drives Halo Sport is a technology called TDCS, or Transcranial Direct Current Stimulation. You're exactly right. It involves creating a current that runs along your scalp, but the important thing is that this current

creates an electric field that is strong enough to get through the skull while gently interacting with your cortex. In the case of Halo Sport, we target the electricity, this electric field, at the special part of the brain called the motor cortex, this part of the brain that controls movement in our bodies.

Maybe the next question is, is, "All right, so what is this electric field doing?" Twenty minutes of this electric field, of this neurostimulation, will induce a 60 minute window of what neuroscientists call Hyperplasticity, or you can think of it as hyper learning. The application for Halo Sport is for athletes, or for anybody who needs to learn movement. If you use Halo Sport for 20 minutes before your athletic training, our promise to you is that you're gonna learn that movement faster. But, just thinking about the technology more broadly, we're not beholdling to just the motor cortex. We can move the electrode to target different brain regions to enhance learning in other parts of the brain as well.

Dave:

It's really incredible that you guys have come out with adventure backed real technology, because brain stimulation has been a very unusual area. That first device that I had, that ran a very different kind of current across my brain, the old Russian stuff, I bought 20 years ago. You can't buy them anymore. It definitely did interesting things to the brain.

But then, when TDCS came out, which is the technology that you're using, the first reports of it were 2003, and this idea that you can put an electrode in a certain part of the brain and stimulate just that part of the brain ... or put it on the surface of the scalp, not in the brain. And, I thought, "All right. This is really cool." I started looking for it. You really couldn't buy anything.

Then, about maybe two years after the first research came out, people said, "Well, here's how to do it with this machine that was designed for delivering drugs through the skin." I bought one of those machines. I started doing this, and wrote about it in the early blog. In fact, I wrote the Bullet Proof Diet using TDCS during a portion of that running currents over my brain, 'cause, hey, it actually helps other parts of the brain besides just the motor cortex.

I thought, "All right. This is kind of cool. But it's super dorky." I took it to an event in Washington DC, with my friend, Derek Coburn. I'm like, "Hey, check this out. It totally works on hangovers." [inaudible 00:10:35] we were using this to make people feel better the next morning. It really made a difference. With Derek, I put the electrode on. We didn't have any elastic bands, so I used a napkin, tied it on his head, at a business networking function. He got a little kind of an electrode burn, because I didn't really have the right electrode. It was too tight on his skin, none of which will happen with a properly made headset, which is how Halo works.

There's no current that could you burn you. What I was doing was using the wrong device, 'cause no one would do this, because everyone was afraid. What you did at Halo is, like, actually we're gonna make these cool electrode little comb things. But you solved all of the safety and weirdness, and inconvenience

issues. You literally put on something that looks like Dr. Dre headphones, Beats headphones or something. You're actually getting the thing through the hair. You have this current, but you only talk about the motor cortex.

My experience is that, when you run that electricity, the neuroplasticity seems to be applying to lots of things I do, not just movement. Is that an area of research for you?

Dan: Yeah, before I answer that, could we just highlight that TDCS is cemented in the history of Bullet Proof? I mean, that's amazing. That's such an awesome fact.

Dave: Yes.

Dan: We're talking about the motor cortex, 'cause that's what Halo Sport does. But let's talk about other applications, of where we can put the electrodes. I think a really fascinating area, maybe the area that has the most research in the published literature, is targeting a part of the frontal lobe called the dorsal lateral prefrontal cortex. Long name, DLPFC is the abbreviation. But, there, if you stimulate this part of the brain, there are some really fascinating data on cognitive control. So, this is our ability to focus, our ability to be attentive and vigilant.

If you are better at that, amazing things happen. You could acquire memory faster, working memory. If you're more attentive, you can acquire memory faster, right? Because you're just more attentive to whatever you're supposed to be paying attention to. You can be-

Dave: Did I hear you just say ADHD?

Dan: No.

Dave: I could've sworn I just heard you say that.

Dan: Yeah, that's funny, because there's actual some decent data looking at ADHD. We've been talking about augmentation here. But, if we look on the other side, which American's are great at, treating disease, I would say the best data, better than ADHD, comes from major depression.

Dave: Interesting.

Dan: Treating this part of the brain-

Dave: Which is basically your forehead.

Dan: Yeah, yeah. It's like the corner of your eye, the outside corner of your eye, up to your hairline. That's the target. There's a study that sticks out in my mind. It's called the select study. This researcher, last name Brunoni, from Harvard,

published this study, 120 people, 30 in each of four groups. So, one group got nothing. One group got a popular antidepressant called Zoloft. One group got TDCS, of the DFPLC. Another group got both Zoloft and TDCS.

The control group, the group that got nothing, they did very poorly, as you would expect. The group that got Zoloft, did as well as the group that got TDCS. Here, that data points towards a drug replacement. You could choose to have your SSRI, your Zoloft or Prozac, or you can probably get the same amount of relief from TDCS. Then, even more interesting, is that the two combined did better yet. So, you can think of adding electrical neurostimulation on top of an antidepressant, to make that antidepressant more effective.

Dave: That makes a lot of sense, because, when I wrote Head Strong, I looked at a lot of electrical signal generation in the brain. Almost everything that happens inside the brain with chronic neuro degeneration, and quite often with depression and all these other things are, there's not enough electrical signaling. Sometimes there's too much. But, it often happens just because there aren't enough electrons being generated and the brain relies on more electricity than other parts of the body. So, if you have a little bit of weakness in the system, it shows up in different parts of the brain. When you're running electricity over the brain, you actually have more electricity in the brain. Is that too simple?

Dan: Well, yeah, that's a great way to think about it, right? I mean the brain is an electrical organ. In many ways, we're speaking its language by using electric fields to interact with it. So, if the last 20 years has taught ... The last 20 years has been this explosion in our understanding of how the brain is connected and how it works. We should use this to our advantage. It would be silly not to.

We know where to put the electrode these days. Like, back in the days of the Russian scientists, we didn't have this kind of FMRI and CT scanning, and this exquisite understanding of how the brain is wired, so you had really big electrodes. It's kind of like the sledgehammer approach. Now, we know the exact areas that we need to treat. Let's put an electrode right over that part of the brain to neuro modulate it, right?

In the case of depression, if there is this part of the brain that needs a little boost, let's just put an electrode over that part of the brain, give it a little boost, and you're helping alleviate the symptoms of major depression without using, say, a drug, that goes all over the place.

Dave: Do you see a day where we have different either locations, or different frequencies, or different settings of TDCS or a device like the Halo that might specifically replace some drugs?

Dan: Yeah, yeah. Let's talk about this technology. Let's have some fun. Let's think about where we are in five or 10 years.

Dave: Yeah.

Dan: Right now we're using TDCS. TDCS, the frequency is zero. But, what if you varied the frequency? That's so called TACS, alternating current.

Dave: Let's pause for a second. So the frequency we're talking about here is just how many pulses per second. So, it's essentially ... it's constantly on. [crosstalk 00:16:49] that's what you mean, just to translate it for non-engineers.

Dan: Yeah, that's right. Sorry. Sorry about that, Dave. So, yeah, the frequency is zero. That means that it's constantly on, and never crosses zero. It never goes back and forth. Yeah, there are other wave forms that we could use that could tune certain frequencies. The brain likes to communicate with other parts of the brain by using this different rhythms. We can enhance these certain rhythms by externally applying them through a brain stimulator.

Dave: Would you believe that 40 Years of Zen, the cognitive enhancement EEG facility that I started in Seattle, that we're using TDCS and TDACS, right now, as part of neuro feedback training for people to increase neuroplasticity, because it actually works. It's super cool. But, that's the kind of gear that is only clinically available. You're not gonna find that stuff on the street.

However, what I think is groundbreaking is that, yes, bio-hackers like me are willing to take devices that weren't designed for this and stick them to our head and do weird things, and get results. But, you, in just about record time, said, "Do you know what? This works. Let's run some trials with like the Air Force Research Lab, Naval Special Warfare, the San Francisco Giants, and Michael Johns Performance Center, like all these substantial names and build a consumer product that's safe, and is useful. You've done that in a very short time. The time in 2003, to, "Oh, we just noticed this works," to, "Here's a product that you can wear like headphones and use for gaming, or use for any sort of sports sort of thing," in 15 years? This would have been like a 50 year cycle for most technologies like this. What let you do it so quickly?

Dan: Well, the experience from our last company really helped. This isn't our first neurostimulator that we've built. The experience of helping to be a part of the integral team at Neuro Pace really helped. And then, too, Dave, I just ... I gotta thank the ecosystem. It's easier to build products like this these days, because we have a wrapper of support. We have the talent all around us in San Francisco. So we can hire the engineers. There's consultants in this kind of thing. And also, the venture capital to support a project like this.

Dave: One of the things that Bullet Proof Radio is here to do, is to get lots of people to know that some of the stuff is possible, because, it sounds like it's straight out of science fiction. But, in this case, it's not. People, oftentimes, don't know that I'm electrically stimulating my brain, because they just think I'm wearing headphones, which is kind of cool. I've done this playing ping pong at home.

It's pretty hard to keep up with an eight year old learning. Those little guys, they learn fast. So, I said to my son, Alan, "All right. You're gonna learn ping pong," which he loves to do. And I said, "I'm only gonna play left-handed." So, I'm a 45 year old right-handed person, which means ... Well, neuroplasticity is normally a little bit lower, as you age. And, I'm definitely not one of those people whose super gifted with my left right balance.

But, I've been able to keep up with his rate of learning. So, he's become a pretty challenging player, because we play a good amount. But, by doing electrostimulation, by wearing the Halo Neuro Sport, I think I've been able to keep up better to the point that I'm not a left-handed klutz when I play, and my left-hand serve is better than my right-handed serve now, which is not something I would've expected.

It's things like that. Is that gonna change my life? No, probably not. But, rapid skill acquisition, as we age, is terribly important for all of us, because there's a return on investment everything you do in your life. You can invest time in learning, or you can invest less time in learning the same thing. It just seems to make sense that if you could spend less time learning, you'd have more time to do fun stuff, or to learn more. It doesn't really matter. Do you see this accelerating in the future?

Dan:

Yeah. I love what you just said. If anything, that is what we are about, is, we are about human learning, and accelerating human learning. We know that human learning, plasticity, starts to decline in our late teens, early 20s. And, you know, for me, I'm gonna fight that every step of the way.

I like to learn fast. For me, and for all of my other adult friends, I wanna be on this virtuous cycle of practice and training, leading to results, leading to me feeling good and positive about what I just learned, leading to more practice, leading to more results, and this virtuous spiral.

What you don't want is the opposite of all this investment and practice and training leading to minimal results. Leading to kind of a negative feeling. Like, why did I just do all of that? To leading to giving up. Right? That, I see all of the time in my adult friends. With neurostimulation, if we can fix that, if we can get people inspired to learn again, and to bring things into their life that previously would've been inconceivable, like what if your lifelong dream was to learn Italian, and today, you're staring at a Berlitz Book, and it's this daunting task, and you put in the time and the effort, and you don't get the payback. So you quit. So it never happens.

I guess that would be my goal for this company, is that, if we can inspire learning all over again. Like your eight year old. He's probably so excited every day to learn, because it's fun for him.

Dave:

Yeah.

Dan: 'Cause he feels the payback, right?

Dave: And he doesn't need extra electricity, 'cause he's already got it onboard.

Dan: He's got all the plasticity he needs. It's an amazing thing. So, what if we can use neurostimulation to make your brain temporarily kid-like? What would you do with that hour of time? So, it's just fun to think about.

Dave: How do you use the Halo Neuro Sport at work? Or in your lab? The things that ... Clearly, you've done a lot of clinical tests and all on stimulating the motor cortex for movement in sports and things like that. But, what do you do? Do you sleep with the thing? Do you put it on your chin? You must do something ... You don't put it on your chin. But, like, what do you do that you don't know is going to work?

Dan: Yeah, we're bio-hackers at Halo Neuro Science. All of us, we use neurostimulation every day. Certainly, we use it the traditional way, like Halo Sports is meant to be used, with motor cortex. But, you're asking what's some of the stuff that we're playing around with?

Dave: Yeah, totally.

Dan: Me, personally, I'm playing around with the more frontal position. With my Bullet Proof Coffee in the morning, fire up the left DLPFC for vigilance and attention, to kind of get me going so that I start the day with this, like this [bullus 00:23:57] of attention. I find that I'm not that focused in the morning. With some neurostim in the morning, I can kind of start my day with a stronger start. I just feel like that kind of rolls throughout the day.

Dave: So, coffee and a side of electricity and you're good to go?

Dan: Yeah. Yeah. A little butter, yeah.

Dave: Did you do that before the interview?

Dan: No, I didn't have the right equipment this morning.

Dave: Okay, cool.

Dan: I should've though. I'm feeling a little slow. I need it.

Dave: Now, will you put this thing on? I know how to do it. I guess I could just put it on. But, kind of walk people through what it's like. I'm actually gonna put on a pair of headphones. You'll hear my rustling the mic for a second.

Dan: All right. Halo Sport looks like a regular set of headphones, and Dave's just putting it on his head right now. What's different about the Halo Sport

headphones is these special pieces on the inside of the arch. We call those primers. But, effectively, they're electrodes. That is where the electric field is being created.

Dave's used the product before, so I'm just explaining it to the audience here.

Dave: It basically has this sort of dense foam thing that just gently kind of goes through your hair and it ... you almost can't feel it. In fact, I have a police officer friend who wanted to practice target shooting better. And he's getting older. He's like, "I wanna have the best score from anyone on the force." So he's putting in extra time. He said, "All right. I'm gonna try this neurostimulation." He doesn't even have any hair. So, it's pretty easy to get an electro signal into someone who doesn't have hair.

So, he puts it on. He's like, "Is it on?" I'm like, "Yes, but it's a very subtle ... not even like a tingle, really. You almost don't know it's there." How much electricity is this?

Dan: Yeah, so, there's 10 settings, one through 10. One is about 1.4 milliamps, and 10 is about 2.2 milliamps.

Dave: And this is on the level of static electricity.

Dan: Yeah, it's very mild. I would say, 90% of our users use it at setting nine or 10.

Dave: Can you have too much electrical stimulation of the brain?

Dan: You can, but, you can't with Halo products. We have ways of limiting the amount of electricity, so, it's virtually impossible to use it more often than you should, or at an amplitude that would be unsafe.

Dave: So, definitely, amplitude just being power level. It's just designed to not put too much electricity through. And having been CTO of medical device companies myself, it's, from regulatory perspective, it's pretty darn important you don't plug yourself into the wall with something that's gonna run current to your brain, for instance. That's almost impossible to do. And, so this is not plugged into anything. It has an onboard battery. You're not gonna cook your head. That's not feasible with something like this. But, if you did 10 hours a day of TDCS, what would happen?

Dan: There's diminishing returns. It's not a safety thing. You might get some skin irritation. We recommend 20 minutes. It's not like ... and if you used it for an hour, it's not like you're gonna get 3X the effect. You'll probably get 1.2X the effect. So, there's some diminishing returns after 20 minutes.

Dave: I've found that if I do a lot of it, not with the Halo device, 'cause it doesn't let you. But, having access to weird equipment, if I do a lot of it, I can get pretty

tired, too. Like there might be more of a learning effect. But, you're just sort of like, "I just kinda feel overwhelmed, and the good benefits seem to go away." But, I also have found substantial improvements in sleep from doing this. Have you looked at any studies in improving sleep quality with TDCS?

Dan: Yeah, so it wouldn't be the areas of the brain that we've been talking about. A different part of the brain, I would say, Dave, at this point, it's early suggestive data, but not conclusive.

Dave: Got it, so the answer is maybe.

Dan: Yeah, yeah, maybe.

Dave: Do you ever use it before you go to bed?

Dan: I don't.

Dave: You don't? Have you ever tried it?

Dan: I haven't.

Dave: It's time. All right. New experiment. You gotta do this. Well, Daniel, I wanna say thanks for stepping out there. Having worked in a part of my career in medical device, I was involved with the very first stick on Blue Tooth cardiac monitor company for like hospital grade monitoring your heart, but doing it from home, and learned a lot about the regulatory side. It is very unusual, and actually courageous for a neuroscientist with great education whose worked on medical devices to sort of step out and say, "I'm gonna do something for non-medical uses." That's kind of an act of courage, because it's not what doctors do. But you did it anyway.

I wanna know a little bit more about what it was like when you decided to not do a medical device. Medical device companies raise hundreds of millions of dollars. They always sell for billions of dollars. The products always cost huge amounts of money and all. You didn't go down that path. What went through your head when you said, "It's time for me to do this crazy new thing?"

Dan: Dave, I had to disappoint you, but we actually founded Halo as a medical device company.

Dave: Okay.

Dan: In fact, we raised our first chunk of money based on that. And then, the FDA did something. They came out with a guidance document that says, "Hey, we know about this technology. It's safe. What we'll do is, we'll exercise enforcement discretion." That means they let the world build and sell these devices for

consumer purposes, and they will just expect the industry to be good actors here.

On that day, my co-founder and I, we looked at each other in the face and we just like, "Wait a second. We can sell, we can build a consumer business, today if we wanted." We had already started down the path of clinical trials, which, actually, these trials are still alive. We wanted to do motor cortex neurostimulation for stroke rehab.

Dave: Huge.

Dan: Right? So, to pair with physical therapy, post stroke, with neurostimulation. Just like you learning ping pong faster, what if we could help a stroke victim walk again? Those clinical trials are actually still ongoing, as you know from your time. Very time intensive, capital intensive. We're continuing to fund that work. But, in the meantime, because of this amazing turn of events, we decided to build a consumer business. You're right. I guess, that day was courageous, because I'm a very technical founder. My co-founder is a PhD. I mean, we know nothing about consumer devices. And so, we had to hire the team to really build this side of the business.

It's been a lot of fun. That part, I just seen the product come alive, and in the hands of so many people has been something like a medical device person can only dream of.

Dave: That's cool. So, you're going down the hospital path again, and realize that. So, you had some flexibility in your business model and said, "All right. We're gonna do it." Well, thanks for doing that, because I have this radical belief that people aren't sick should have access to technology that makes them better. You, I think, are one of the early companies to just step up and say, "All right. We're gonna do that."

Dan: Thanks Dave.

Dave: One more question for ya, Dan. If someone came to you tomorrow and said, "I wanna perform better as a human being, just better at everything I do." Just based on your life, based on your career, based on all the stuff you know, what are the three most important pieces of advice you have for them? What would you tell them?

Dan: Can they be boring?

Dave: They can be whatever matters most to you.

Dan: For me, a healthy dose of sleep, not trying to shortcut sleep. I try to get eight hours. They say you need less sleep as you get older. I don't find that to be true.

I find it that I still need seven and a half, eight hours of sleep. I try to take that very seriously.

Another piece is exercise. Try to have it built into my life. We were talking about my commute, which is only one mile. But, if I walk it or bike it, it's just a built in part of my life where I get a daily dose of exercise, even if my day between work and family is just completely slammed, I have exercise built into my day, via my commute. Of course you want more, but, at the very minimum, I've got that.

And third part is just fueling your body correctly. I know that's one of the things that I thank you for, is just thinking about how we fuel our body, thinking about ways of using modern nutrition and findings to get more out of our life, to put proper fuels into our body, to help our brain, help our body perform.

Dave: So, eat, sleep, and move.

Dan: Yeah. Is that too boring?

Dave: No, not at all. It's pretty shocking. But, I've done the statistical analysis of what people pay attention to. People who are high performing. You're a neuroscientist, and a CEO and things like this. The number of people who have realized, all the most important things that they could say ... One person did say coffee enemas, which I thought was pretty bizarre. But, for the most part, it's like, "Okay. These are fundamental, but these are areas where most people don't do it right, or they don't focus their attention on it, because these are sort of like things you just do while you're doing other things."

So, no, I think that your life's experience, if that's what you came to, that's not boring at all. That's just useful advice that reinforces what I'm hoping listeners have already picked up. That, those are things that are not optional if you wanna perform well.

Dan: That's right.

Dave: Where can people find out more about Halo. I know you guys are doing something nice for Bullet Proof listeners.

Dan: Yeah, website is HaloNeuro.com. You can find us on all the various social channels as well, Facebook, Twitter, Instagram, just a quick search and you'll find us.

Dave: All right. HaloNeuro.com. And, what you're doing for Bullet Proof listeners, which is awesome, is, when people go to HaloNeuro.com, if they use code BULLETPROOF at checkout, you can get the Halo Neuro Sport for \$475.00, which get this, saves you \$275.00 off the regular retail price. That is a really substantial discount for people listening to the show. And of course, because you listen,

you're either a bio-hacker, or maybe you're just really cool. But, either way, this is a substantial discount for you. The code is BULLETPROOF at HaloNeuro.com.

I can tell ya, I absolutely do use this. You've probably seen me on social media using it. It is the most safe and effective way of doing TDCS that I've come across since I've started playing with this. It's very simple to use. You actually don't even look like you're doing something crazy when you use it.

Dan: Awesome. Thanks Dave. This has been fun.

Dave: Go to HaloNeuro.com and use code BULLETPROOF and you get a massive discount because you're a listener of Bullet Proof Radio. And, I've gotta tell you, a little bit of electricity like this on your brain can be really transformative. I actually use this, and I fully endorse it. It's just fantastic to be able to do something that's quick and easy, and makes a massive difference.