Why Normal Lab Results Don't Always Tell the Full Story Transcript

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Introduction to Dr. Dave Raven and Apollo Neuro

All right. Well, welcome to the Table Talk podcast. I'm really excited today to have on Dr. Dave Raven, who is a physician and PhD. So, he um is a founder and co or co-founder and the chief medical officer of Apollo Neuroscience. And today we're going to talk about regulating the nervous system because this is something that we really feel that if your nervous system isn't regulated, it's really missing that foundational piece of getting someone well. So um so I really want to talk to you Dr. Raven about you know how did you come into this world of nervous system regulation and how um did the Apollo Neuro product really come to fruition. Um so if you want to start there.

>> Sure. Uh I mean I think maybe I'll work backwards. So Apollo Apollo Neuro is a wearable that you and I are both wearing. You have it on your wrist. I have it on by myself. and it delivers a silent soundwave vibration technology that we developed at the University of Pittsburgh trying to figure out better ways to treat and address the learned fear response that happens in veterans with severe PTSD. And that learned fear response, which is basically what we call trauma, learning in the body, is um something that really makes it hard for people to recover from PTSD, especially veterans and people with childhood trauma. And we've seen this for a long time. So this was our treat, you know, like like a lot of great discoveries in medicine, it started with a treatment resistant patient population that seemed to defying what the good book, the DSM said about how these people should respond to treatment where over 70% of them are still sick after multiple full courses of treatment. And that had a high co-occurrence of substance abuse disorder because when if they're going through all the treatments with us and and our treatments aren't working, guess what they're going to do? they're going to go to try to find something else that works for them that they can themselves >> and self-medicate. And so these this was a huge problem.

Origins of Apollo Neuro and PTSD Research

It still is a huge problem. But at that time between 2014 and 2018, we realized that from studying the stress response system, which was kind of um my original passion was around studying dreams and meaning and how we make meaning about the world um and how that impacts our performance, how that impacts our recovery, how it impacts all these different parts like wellness, illness, and all these different parts of our lives. And so I started studying resilience and chronic stress in you know I don't know maybe like 20 years ago on a cellular and molecular level and then gradually as I learned more started to realize that chronic stress and how we deal with it on a whole person level is fascinating and it's an opportunity to look at like why do some of us who face stress become these ultra elite high performers like the Michael Jordans and the Kobe Bryants of the world right and and many many other people who we know, right? We just watched we're just watching like the Winter Olympics now and these are just some of the finest specimens of humanity who have undergone undergone tremendous challenges to achieve like incredible feats that most people could never fathom doing. And then we also have people who experience similar kinds of trauma who develop illness instead, right? And there's this spectrum in between of everybody else. So how do we so this really fascinated me is that the same kinds of stress can result in superhumanness and illness >> and how we look at that stress seem to have big impact. So started to study safety and safety is what drove the as an kind of like an untapped thing that we talk about in medicine and psychiatry psychology but we don't actually treat or address it directly >> um with patients in a lot of ways especially people with mental illness and the lack of safety in the body turns off it turns off the vagus nerve which is our key nerve of recovery and uh sleep digestion immunity reproduction empathy all the Good stuff in life comes from gentle activation of the vag nerve. So we saw there's a neurobiological coralate to how we feel. When we feel stressed, vag nerve activity shuts down.

Fight or flight turns on. When we feel relaxed and safe, vagus nerve activity turns on, shuts down the amydala and fight or flight, right? And there's a dynamic balance going on. So that understanding of stress led us to say, okay, well, maybe we can deliver safety to our veterans and our people who have had this severe trauma disorders, maybe we can give them safety more easily because when they're listening to music at home, when they're snuggling their friends and family and pets, when they're smelling their or eating their favorite foods, they're not

symptomatic, >> right? They're actually feeling great during those moments of high sensory experience, presentness, safety cues.

And when they're in our office with us feeling safe with a with a therapist in a trusting relationship, they don't have symptoms as much. So how do we give them something that they can take that take that safety home with them? So from the study of the nervous system combined with the studies of MDMA assisted therapy that we were doing and how MDMA activates the safety response system in the brain and soothing touch activates the same system. And we figured out that you can deliver soundwave vibrations to the skin that are like music for the touch receptors instead of the ears. And so the touch receptors sense that bass vibration like the same bass that comes out of a subwoofer or um a double standup double bass but delivered very gently to the skin anywhere on the body.

Body feels it recognizes the ocean wavelike rhythm which is the rhythm we're supposed to be breathing at and then the body automatically attun. >> All right. Go ahead. Um, >> so from that understanding of the stress response system and how it works to learn about fear and safety and then combined with some of the um new information that was coming out of the MDMA assisted therapy studies that activate the safety part of the brain with a substance reliably to help people heal from PTSD. We saw that soothing touch also activates the same part of the brain as MDMA but naturally.

How Apollo Uses Vibration to Regulate the Nervous System

And so we developed Apollo to activate with sound waves the uh the soothing touch receptors in the body of which there are several that send safety signals to the brain just like getting a hug or snuggling a pet or feeling ocean waves wash over you but something you're in control of that you can take with you anywhere you are. So that uh is now being used in all these populations we started working with and many general consumers and regular folks throughout the world including us and it's a general consumer product that's been in market since 201. >> That's awesome. So the vi the vibration um not only the tactile component of that um but then even the sound waves um so I guess explain that. How does that stimulate the brain to be affecting the vag nerve? Well, how do you feel?

>> How do I feel? >> Yeah. How do you feel when Yeah. When somebody you when when you feel Apollo and you notice the vibrations on you like what do you notice in your body? >> So, I notice um that you get calm that you have and there's different obviously we could talk further about this.

There's different settings in there as far as like the confidence vibe or um which is the one I'm running right now. But then there's also sleep and different things. So, I think it probably depends a little bit on the vibration and the pattern um into how you know someone's feeling. But I guess just for the general consumer, the general patient that's interested in this thinking like how does this Vegas how does the Vegas nerve and how does this compare I guess to um some of the other tools out there that maybe someone holds on their neck or the ones that are maybe PEMFbased like is that sort of a similar sensation that they would be feeling with this? um or are there advantages to using this type of virotactile stimulation um compared to those other meth method methodologies I guess.

>> So the main difference and advantage of Apollo and why we developed it is because there's no electricity transferred to your body. >> Okay. >> In terms of how it works, it just uses soundwave vibrations that are bass vibrations. So when you're Have you ever been to a live music show where there's a subwoofer or loud bass vibration? You can feel it in your body, right? >> So those vibrations in that frequency range which is like below 100 hertz frequency are felt more s our bodies the bones the skin our vibration receptors are much more sensitive to those frequencies of sound than our ears.

So when we put those frequencies against our our skin or against over our clothes like I'm doing with mine, you can feel those base frequency vibrations very very much on the skin and it's or through the skin and it's very very gentle but it's enough that it sinks the body into coherence because our body tries to match the frequency around it. That's why when there's a baby screaming in the room and and continuously you're on a plane or you hear a jackhammer working outside and construction sounds, your thoughts go faster. Your heart rate goes up, your breath rate goes up automatically because we're syncing with the environment. So the more calm calming sensations we have close to us on a regular basis, the better because that increases vag nerve activity around the clock and it does so automatically in the background tuned to your body without any input required from you. So that's why Apollo is

totally unique from anything else out there because you just strap it on and it does everything for you. The and it trains based on your data. It learns with AI. Traditional Vegas nerve stimulators apply electricity to the body by you pressing a button when you need it, when you want it. And you're only supposed to use them roughly once a day for about 20 minutes a day. And you could they have side effects. So they just turn the Vegas nerve up. They activate it with electricity on the skin so they can burn the skin. They it feels like electricity, so it feels like shock. Um so a lot of people don't like that and a lot of people won't use them regularly. So that's why that you know we saw this gap in the space where people need vag nerve stimulation. We need healthier vag nerve activity um of which Apollo does both. It's it's actually a vag nerve modulator. So it's not a stimulator. It doesn't just turn Vegas nerve activity up. It turns it up and down. So flow states are a state of balance more balanced Vegas nerve and sympathetic activity. Vegas nerve stimulator won't put you there when you want to focus or socialize at a party. It'll make you too calm. So Apollo can turn your energy up and down just like music. It's lit like it's like when you go to work out or go dance, you listen to fast, loud music, right? >> When you go and try to fall asleep or meditate, you're listening to calm, soothing music.

>> Yes. >> Right. So it's the exact same thing with Apollo. And so Apollo allows us for the first time as humans to be able to in real time without distracting you from any other part of your life tune the mood and energy level of your body by shifting your vagus nerve activity slightly up and down. And that's really really helpful if you're a regular person just trying to like sleep, you know, get good sleep at night and focus during the day with enough energy without overdosing on caffeine and and you know, alcohol and sedatives at night. But it's extra extra helpful with people who are struggling with certain trauma- related or mental illnesses because um it just helps them feel in control again and take the edge off some of the symptoms they're having. >> Yeah, absolutely. I love that because we see as in the functional integrative medicine community, we see trauma being a factor in so many people's disregulated HPA axis. So, and I think a lot of them like probably and I think you know we talk a lot like big T trauma, little T trauma like what like small inputs to the HPA axis did they have in the past? Um, but I think so often like whatever it was that happened and I think COVID was somewhat traumatic for all of us, even though we wouldn't consider that the same as like PTSD that military and people experience, but for some level I've had teachers that left their classroom, never saw these students again, like all of a sudden like their world was different and it took them a while to like rebalance their HP axis and not have that feeling of like I don't know what's happening and that loss of control in some aspects. So, I love that this is gentle and can be used by different populations. Um, and speaking of that, um, can you talk a little bit about your experience with this in pediatrics?

Apollo for Kids, ADHD, and Trauma-Related Focus Issues

The first time I heard this about this product was actually from a pediatrician that speaks at many integrative and functional medicine um, conferences and she was talking about using this with patients with ADHD. Do you guys have any clinical work that you've done in that space or what does that look like? >> Yeah, we've done some early clinical pilot work with kids. Um and we have thousands of kids using Apollo currently just in the general world. But the early clinical work uh combined with the reports we hear back from people is extremely promising. Um the main thing that we see is that kids are again one of the one of the major reasons why kids struggle to focus that I think is not well taught is and but it is well understood is that they're distracted which we know. But the follow on to that is that they're distracted by feeling out of control of their lives. Right?

Most kids don't have much say in what's going on. They're told to be somewhere at certain times, do certain things, which is good. Kids need structure. But they also need to feel autonomy and mastery because that will that makes them excited about what they're doing. Otherwise, if they don't feel a sense of autonomy and mastery, which all humans need, then they feel like they're just a pawn in a cog in the wheel, right? Like brick in the wall. It's not fun for them. And the whole point is learning is supposed to be fun. So the um so Apollo is really really helpful because [clears throat] when kids don't feel in control of where they have to be at or where they're supposed to be at any given time or most of the decisions that they are you know be making on a daily basis then now they can have the ability with Apollo to control their feelings and control when they're in a focused state and when they're in a sleepy or relaxed state. And for kids to start to learn how to do that through the breathing training that Apollo in facilitates in the body, it is very very powerful and helpful for them. So we've seen many many kids that are considered in our in our pilot trials uh in a pediatric clinic in Pennsylvania, we saw this clinic only saw treatment resistant children with like what we call the triple threat, which is like autism, ADHD, and anxiety. And these kids did not respond to anything, but they responded to Apollo and they were participating more in treatment. They were more active, they

engaged. They felt and they were talking more in therapy a lot more. Kids who wouldn't talk for months or years were actually openly communicating their feelings because they felt safe enough to talk about them and they felt safe enough to redirect their focus because they weren't distracted by all of the things that are outside of their control. They're actually like, "Oh, wait. I can tune in right now." And kids are really sensitive to that because they haven't been they haven't most of the time they haven't had all their innocence, you know, broken by the hardships of adulthood. Um, so there's still a lot of opportunity and and for fast learning in children of all ages that starts to we can still learn as adults fast, but it starts to deteriorate in speed over time. So there's like they're a lot more like malleable. So Apollo's been really helpful for that. We see a lot of uh people using it to uh help manage some of the challenges with autism and um with great results and we um and for and ADHD is a huge part of autism. And now studies have linked ADHD to trauma. And that kids who have ADHD often times are very likely to have had a history of some kind of trauma in the past, which guess what would make a lot of sense for why they're distracted all the time because they have unresolved unprocessed trauma sitting there just knocking at the door being like, hey, you know, process me. I need attention. And you know, they're trying to focus on math.

So it's it's hard. Um, so safety is key to augmenting focus in all of us, but kids especially. Helps kids come off of meds. Good. >> Yeah. And that's I love that. And I think a lot of times people think pharmacists want people to be mom meds. We don't want people to meds. We want to help deprescribe. And especially in those treatment resistant populations where medication isn't working necessarily. Um, we want to take them off of it. It's not working. I think so often, and you've probably seen this in the psychiatry world, people just get put on something and put on something and put on something. I actually did my residency at the VA and saw um a similar population as you started your studies with with the PTSD and it was just like, oh my goodness, these people are on 10 to 15 medications and still having the same symptoms that they had at the beginning. Um so to be able to give a tool that's working in a different way um in a more physical way um to stimulate um their ability to focus is amazing. Um so what do you feel from like the general consumer standpoint? Um, I think a lot of people, you know, are trying to decide what step to take to work and we talk to them about meditation. We talk to them about taking nature walks.

Stress, Safety, and Daily Nervous System Regulation

And I think the thing for me that makes this easy is that it can be part of your day and it doesn't require that you go and do something else. Um, but for a lot of people, I think like st I mean stress is just all around us. It's not going away. Um, so some people think, oh, I just need to de-stress. And obviously that's not the ca I mean it is the case that you do need to de-stress and taking a vacation and walking on the beach is great but if you don't have money for that or you don't have the ability to take the time off or you don't have um if your life looks crazy where you're in you know a relationship maybe I have a lot of people that are divorced and like they're taking kids back and forth from different places and you know they're having trouble dealing with that other person that they're raising children with and so like all of that's not going away. Um, and so I think like tools like this are super helpful to helping people understand or help to people to find balance in themselves without having the external situation going away. So I guess what are your thoughts on that as far as like other patient populations maybe that you've seen this to be helpful in? >> Yeah, I mean that's that's exactly the goal, right? Is to help people understand like stress is inevitable.

It's always going to be around. going on vacation to address stress is like going on a diet to address being overweight, right? Like if you return back to the same if you it's it's good to take breaks, but if you return back to the exact same environment and behavior you were doing before you started, then everything's just going to revert back, right? There have to be long lasting behavior changes that allow us to sustain the benefits of what we're doing. And if we don't if we don't focus on the or if we don't understand what the path to get to our goals is and we keep trying to achieve our goals, but we're like walking in the wrong direction. We just get lost over and over again in the forest and then eventually you just give up and you're like, "Oh, maybe my goals aren't achievable." Right? But your goal, everybody's goals for health and wellness are achievable. Like health is achievable for for nearly every single human being. And it's just about starting with changing the way that we think about stress and you know starting with like a little bit of a perspective change and knowing that we have the capacity to achieve wellness and then finding the path and sticking to it and doing a just doing a little bit a day every day. You're for free like your body starts to shift its physiology and increase vag nerve activity. Breath is the easiest like breathing by choice the single easiest most freest thing that any single person can do in any moment to stop the cycle of negative intrusive thoughts. Also then layer on like humming, singing, soothing touch, mo, you know, movement of

any kind, stretching, walking, anything, putting delicious food in your mouth, smelling something amazing, right? Like all of those things immediately restore a sense of safety in the body. Once you restore safety in the body, the body starts redirecting resources almost immediately through the vagus nerve through the HPA access regulation and decreasing HPA access activity. You when it's not needed, our body starts to redirect resources to the parts of our brains that are critical for learning new things.

Approaching newness with curiosity and the unknown with curiosity, right? Learning new habits requires us to feel safe in and of itself. So stress physiologically puts the body in a state where it opposes learning new things. It opposes all kinds of newness. So like you'll appreciate this too because it is a huge reason why the placebo effect and the noibo effect exists, right? So like if you're when you think about medicine, we see that people who believe their medicine is going to work. If there's two if there's you're two people and they're both taking a sugar pill, people who believe that the medicine's going to work had that sugar pill works like 30% more of the time. And people who believe that it's not going to work means it works doesn't work 30 to 50% of the time. And then and then negatively believing believing that something's not going to happen is even more powerful than believing something is going to happen. >> Yeah. But e either way, you have to feel safe enough to believe in anything, right? Happening, right? And if you feel not safe, we're more likely to believe in nothing in in the negative that nothing's going to work for me. I am never going to get there. I have, you know, I have no hope. Maybe there's something wrong with me, right? And all of those thought processes are not true or useful to us. They just are accumulating um our attention to actually do something different. So that that process is really really important to understand and it starts just asking like how can I grow from this challenge today right not like why me why is this happening to me it's like how can I grow from this challenge today and that's where it starts and everything that we do that builds that increases Vegas nerve activity increases safety including Apollo increases the effect of medicine that we use as well in terms of getting positive outcomes which is really interesting and things that when we do the opposite it decreases is the effectiveness of medicine. And we see this with Apollo where people actually have better responses to medicine and require lower doses of medicine to get the effects and less side effects when using something that boosts Vegas nerve activity at the same time.

>> Yeah, I love that. I have a couple hypertension patients right now that I would really love to get using it because I feel like a lot of their high blood pressure is driven from the constant stress of their jobs and while they're controlled with two medications, they might not even need one of them or if any of them if they I mean certainly there's nutrition components and nutrient deficiencies that are associated with hypertension and nitric oxide and all of that conversation, but I think at the forefront of a lot of what we deal with in pime I mean from from a pharmacy standpoint and from a primary care standpoint um there's a lot things that we would need way less medication for if people were in um a less stressed state and a more balanced state. So awesome. Well, I appreciate your time today. Um is there anything that's like your you know pearl or your favorite thing about using Apollo or your favorite um setting to run for yourself?

>> I mean my favorite setting on Apollo is probably the social vibe. Okay. >> Because I always and I'm using that right now. Um, I use it generally for public speaking and for presentations because it just keeps me present in the moment.

Social Vibe, Creativity, and Closing Thoughts

Um, and it also is the vibe that kind of enhances creativity the most, which I really like because I feel like I don't know when I was a kid, I feel like I creativity was encouraged by some parts of my life like my parents, but it was kind of discouraged in other parts of my life in school. And so I had this like weird thing where I struggled to allow my like free my creativity to be like freely expressed. >> Sure.

>> And so that vibe for me takes all it basically relieves all of that stress or and like self-doubt that prevents my creativity from coming out and just lets me do it. And um over time as I've used it, I've gotten better at just allowing it to happen because it when it happens I the outcome is so great that I realize like I can start doing this on my own. So Apollo is not just like getting me there and then requiring me to use it to get there. I'm actually training mindfulness circuits in my brain between my attention centers and my prefrontal cortex and my amydala that and my emotional cortex that basically are helping me build attention musculature, right? Like we build muscles by increasing the strength of neural connections in the brain and the body between our muscles and our brain. And

the stronger those neural connections and the and the bigger the muscle fiber, the stronger the muscle, right? It's not just how big your muscle is. It's the nervous system connections to the muscle that make a huge difference. And so when we do these practices, these like attention based practices, even just like what I mentioned earlier, when something hard happens to you, to any of us, making sure that we that we notice that the what is the first question we're asking, right? Is it why me? Is it why do I deal with this today? Or what did I do to deserve this? or right any number of those things that are listed on the happens shirt based on religion they're so common people's responses based on religion right in terms of like the guilt of when something bad happens how do you deal with it right like that that shirt I think is like one of the greatest um parody shirts of all time and if nobody if people don't know what I'm talking about look it up but it's it's the idea that you know we can by just accepting what's happening rather than pushing back against it and asking why we just say, "Oh, this happened. It's probably there's probably something I'm supposed to learn from this. Let's figure it out." Right? And then all of a sudden, our com our outlook, our body doesn't go into a distress response as a result of facing that challenge. It goes into a response of like of focus flow and how do I problem solve this? Right? How do I get out of this quicker? How do I and then afterwards it's like, oh, how do I prevent this from happening next time because that wasn't that fun. >> Right.

>> Right. So that's that's a natural process that we have to go through for growth. But when we resist it by pushing back on it by like, you know, putting our arms up against the stress the stress river and and trying to like hold off the water, it's just going to going to wash right over us and knock us down and toss us around a bunch. It's not going to be it's not going to be fun.

Like the fun comes from learning and growing from the challenges and and and practicing seeing and noticing the challenges as growth opportunities more than anything else. And these little tricks I talk about in my book um which is coming out in the spring uh called A Simple Guide to Being Alive that anyone can check out and get the full story. >> Yeah. And we'll link that in the show notes um and on YouTube. We'll put that in the notes as well um once it's available. Um but yeah, I love that the social component or the social vibe is what you talked about because I also think that like we've missed that community is such a big piece of health and balancing our HPI axis. So like all of that stuff happens naturally in some ways when we are in community and we're having dinner with a group of people. We're such more more relaxed than we're trying to do it on our own or we're you know feeling safe in that community. Um so like you said the safety component and letting yourself feel safe um to make those decisions and to um to handle things um is super important to be engaged with community as well. So I love that. Well, thank you so much for your time today. I know you're busy. Um, so I really appreciate you coming on here and chatting with us a little bit about this and um, look forward to reading your book as it comes out and learning more.

>> Sounds good. Thanks for having me. >> Awesome. Thank you.