Speaker 1: Bulletproof Radio. A state of high performance.

Dave: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that adapting to life in northern climates may have actually been a real headache. Researchers just discovered that there's a certain genetic variation in a cold sensitive protein that's way more common in people from northern Europe than it is in Asians or Africans, and that variation is linked to migraine headaches, which you're way more likely to get if you have northern European ancestors.

For instance, in Finland, 88% of people have that genetic variation and they have a much higher risk for migraines. But if you're from Nigeria, only 5% of people have that. We don't think it's a coincidence. The new study authors suggested thousands of years ago, this mutation made people who lived in cold, dark places better able to handle them, and it's called TRPM8 for people who like to go google that sort of thing. What that means is that you might be more likely to get a migraine if you're from that genetic history. What you can do about migraines? Well, that's probably a mitochondrial thing or a blood flow thing, and I'm not gonna tell you how to solve that right now, but I can tell you that eating less stuff that causes inflammation is probably a good start.

If you like today's show or you liked that cool fact of the day, if you go bulletproof.com/itunes, it'll take you to link where you can subscribe to the show and leave a review, which is something that I track every single day. So thanks, if you decide to do that.

I'm really excited about today's interview. Today's guest is Dr. Ted Achacoso, and I'm really excited to talk with him because he's a geek from artificial intelligence land who turned into an anti-aging guy. We're talking about being a leader in fields like medical informatics, artificial intelligence, quantitative trading, and most interestingly maybe, is the mathematics of consciousness.

He wrote a book more than 20 years ago that had the first ever neural circuitry database, which is called a connectome, and he did this for a very small organism called C. Elegans, and was the chief science officer for a company that did work in parallel and cluster and cloud computing, which is kind of cool because that's also my background. He wrote this paper that said, "Hey, here's the flow of information across small organisms," and it turns out that that was a seminal paper, even though it wasn't recognized for more than 10 years.

Our neurons, our mitochondria, and pretty much most biological systems have this connectome, but it was invisible to science and it took someone who had a medical background and a ... we'll just call it a big computing background, to put that stuff together. On top of that now, he's created a field called health optimization medicine, and this is something that ties together clinical metabolomics, epigenetics, bioenergetics, your gut immune systems, chronobiology, evolutionary medicine, basically stuff you might have heard about if you listen to this show, and put it all together into a coherent system that you can use to be better instead of just not sick. So you can see why I wanted to interview him.

Ted, welcome to the show.

Ted: Thank you, Dave. Thank you for having me.

Dave: Now you are ... I think the technical term is a crazy smart guy because you've been quoted as saying that on bad days your IQ is 186 and on good days it's 210. True?

Ted: Yes. True. It's more measured like this. At the time that it was measured, there were only four billion people on Earth, and it was one in one billion. Now that there are eight billion, I presume that there's eight now [inaudible 00:03:54] one in a billion.

Dave: So you're less cool than you used to be?

Ted: I'm less cool than I used to be. I've been diluted.

Dave: I wanted to start there, not so that you could say, "I'm super smart," although anyone who hears this interview is gonna figure that out pretty quickly. What's up with that huge variance between 186 and 210?

Ted: Well, it depends on what psychedelic I'm taking. I'm kidding.

Dave: Nice.

Ted: The brain actually goes in cycles. Much like any other system of the body. There will be certain bodily states or states of bodily function. Your hormonal state, your nutritional state, et cetera, that can actually decrease performance, increase performance, either cognitively, physically, emotionally, and I was actually surprised. It was only a few years ago where they discovered that the testosterone levels in men, for example, would have a biphasic curve. It rises twice in 28 days. It gives men two times the opportunity for reproduction. Those kinds of cycles right now are just getting revealed to us.

If you're sensitive to those kinds of things like, for example, looking at me and my cognitive performance, you'll see that ... you feel in an off day, all the other variables being the same, the performance suffers when you lack sleep, when you didn't get enough sunlight exposure, you don't have enough activity, and so on. I said, "How do you measure these things?" I said, "Right now, we could actually measure them through metabolomics, because all of these activities throw off metabolites, and you can see their levels. You're not necessarily sick, but you could automatically monitor performance of all of your cells in your body.

That's what got me into thinking about Dave has been podcasting for the longest time about mitochondria, microbiota, expletomics, epigenetics, chronobiology, evolutionary medicine. How does it all tie together into a discrete critical practice? When I sit down in front of a patient or a client, what should I do? Turns out that there's actually available now, a science called metabolomics where you could actually measure the levels of the metabolites being thrown off by your body, either endogenously or coming from

yourself, coming from the toxins that you eat or you inhale, coming from food, and so on. In fact, there's a human metabolome database out there, maintained by Canada.

I said, "Illness medicine detects and basically diagnoses and treats disease." I said, "Let me borrow a page from their book of marketing." I said, "Health optimization medicine detects and corrects imbalances at the level of the metabolome. I chose the level of the metabolome for several reasons. The metabolome, for example, the genes or the genome can tell you what might happen. The transcriptome can tell you what appears to be happening, the protiome can tell you what makes it happen, but it's the metabolome that tells you what is happening now, or what has just happened. That's what we need in clinical practice.

How do you tie this all together, all of these new things that are not taught in medical school, and incorporate them in clinical practice? Then I realized this is really shifting level of medicine away from the organ level to the specialized function level, like the organ level, like the heart or the brain, or the pancreas and the specialized function of the pancreas, the insulin production, et cetera. Those are all within the realm of illness medicine, but when you get to health optimization medicine, who takes care of the foundational cell or the fundamental cell? The nucleus, the mitochondria, the plasma [cuticula 00:08:09], all of these things that we actually never paid attention to.

The reason we didn't pay attention to this is we didn't have the science of technology then, but now that we do, why don't we pay attention to the foundational cell that underlies all of the cells in the body? That's what actually is connection between how you shift perspective away from illness, how you shift perspective away from poor performance as we started this time shift with, into something that encompasses just dealing with the health of something. If it's foundational health, then everything else that arises from it will get affected. Right?

Dave: Yeah.

Ted: If you affect the foundational health of the pancreatic cell, for example the basic cell, then the pancreatic function improves, then the overall blood sugar metabolism of the person improves. Same way with cognitive function, same way with everything else.

Dave: I wrote since the very early days of the blog, I've used techniques to raise my IQ by at least 20 points. It pissed so many people off when I said that. "You can't do that." It's like sorry, I just did. I like that. The "can't" statement is fundamentally not true. Dr. Amen from Amen Clinics came on my documentary for toxic mold. He's like, "People lose 15 IQ points all the time by being in a water-damaged building." I'm like, "Funny. I removed myself from one of those. Maybe I got 15 points there."

I used a bunch of brain training and bottom line is, there is a daily variance in your IQ based on your metabolism, your metabolome as we're talking about here. I was fascinated just to hear that you paid enough attention to that to say, "Wow, I have a 20 point swing, just about." In your case, I think a little bit more than 20 points just based

on, how am I doing biologically right now? Just to be able to talk about that is important for people listening.

Ted: I think my variance is closer to schizophrenia. I'm kidding.

Dave: It's just positive schizophrenia. That's totally good.

Ted: One of the things I noted, Dave, in terms of the variance is on days of low cognitive performance, for me, is my incapacity to integrate a lot of things together. I begin to compartmentalize a lot of things, which is what happens in schizophrenia, you compartmentalize a lot of things. When you are on high-functioning states, you're able to integrate a lot of things. In fact, you're able to step away from what your ego wants to do. You observe the ego and what the ego wants to do, and you actually observe all the other variables in the situation that you're assessing at hand, whether it be a client, or a patient, or a business situation you have to deal with, a computer problem, a mathematical problem.

One of the things that was so interesting with us being taught heavy geometry and biomathematics by my mentor, who is a pioneer in medical informatics globally, [Billy Amoto 00:11:21], he said ... I was working on an equation and I couldn't remove this constant in there because it was a constant. He looks at me and he said, "You know Ted, if murder is part of the solution, don't take it off the table."

Dave: Wow, that's kind of dark.

Ted: It is dark, but I saw his point. He was referring to a mathematical equation. When I took away the constant, I found my solution. That kind of thinking comes to you when you're not compartmentalized. When you're functioning at 100%, you see that there's nothing in there that you have held sacred that's actually indispensable, and suddenly your mind is able to actually find other solutions for it. That not only makes sense, but it becomes useful in the long run.

Dave: That's kind of what computer hackers do, that's my main background. How do you build stuff that you're not supposed to build? How do you control things you're not supposed to control, say like your own biology? I do find that when I teach my kids things, saying you can't do something or something's impossible, we just don't say that in the house. They argue about it. My son would say, "You can't travel to the middle of the sun without a space suit," or whatever. I said, "Oh really?" He said, "Yes." I said, "Great. Now change the laws of physics. Can you do it?" He was like, "Maybe." I'm like okay, here's the deal. There's always assumptions in there, and they're usually false but useful. It's hard to change laws of physics. We don't know how to do that. It doesn't mean you can't, it just means no one's done it yet.

Ted: It's really interesting, Dave, because four years ago I read this book called Inner Journeys to Outer Space. It was about psychedelics. Then he said essentially ... It got me to thinking because of the [inaudible 00:13:20] mentions in hyper space and so on and so forth, but the rest are curled tightly into a ball. It said, "We should not probably be

building spaceships because we can never get to those dimensions. Probably we have to use molecules with the proper vibratory state in order to enter those dimensions." That really got me through a lot of thinking about how to access other dimensions. I'm like you, I'm weird like that. How do we access these other dimensions that physics is positing to be true and so on? Surely, it's not by another [inaudible 00:13:55].

Dave: I interviewed Nassim Taleb recently.

Ted: Nassim Taleb, yeah.

Dave: Sorry. I knew I had a thing wrong. By the way, speaking of cognitive function, there's three words I haven't been able to think of so far in this interview, which tells me today is not a high-functioning day for me. I haven't figured out why yet. I actually slept more than normal.

Ted: I'll infuse it with energy so you'll have bio-quantum teleportation.

Dave: There we go. I can remember everything. My IQ just went up 40 points. No, I was gonna ask you something. Most people probably aren't watching the video. In fact, it'll be just audio, but behind you I see on your mantelpiece you have four unicorns and one piece of sacred geometry art that's either a Flower of Life, a MerKaBa thing, or some sort of related thing like that. What's the significance of unicorns, and sacred geometry, and Kabbalah, and things like that in your way of thinking?

Ted: In my younger days, and that's a long time ago, someone gave me a book, I think my mentor did. The title was Fearful Symmetry, and the subtitle was Is God A Geometer? It was written by one of my favorite mathematicians, Ian Stewart, who could send me into a three-month long depression just by writing one statement in there that could be imputed to be true for humans. In there he said ... In the subtitle itself, he's got the geometer, and the whole thing got me to thinking.

For example, when I'm looking at things like people are looking at astrology and horoscopes all the time, I wonder why people do. I wonder whether or not it's a suggestion or anything like that, but what if they break into a symmetry of time, like for example, breaking into glass. In the symmetry of time, there are many paths, but those paths are fixed. You can go from one path or the other, and essentially you're just following the path. Then there's a pattern. Questions like this are curious to me. I worked a lot on chaos theory. In fact that's the logo of health optimization medicine, is fluttering of the butterfly causing a hurricane with the Flower of Life at the center.

For me, it's like geometry provides us with a mental scaffolding for thinking about a lot of things that we even think are not related to, say, a medical problem or mathematical problem, et cetera. It's always very clear to us. For example, duality in terms of enlightenment [buddies 00:16:43]. When you manifest in this dimension, that's the philosophy. You manifest in this dimension, there is a duality exists. There is light can't exist without dark, good without evil, and so on and so forth. It actually finds its way into our philosophies. Both Western and Eastern philosophies carry those.

For me, looking into these various types of geometries, specifically topology, especially the toroidal types of geometries, they're highly interesting. I set aside time to study what the current theses say about these structures. For example, the isotropic vector matrixes, like Nassim Haramein, that says it collapses at the square faces and causing a jitter-bugging, causing a toroidal structure, and therefore you have the quantum foam, and therefore matter is manifested. He makes a point. Being able to take that with an open mind is always good for you because you can then integrate it into other piece of information.

I used to collect pewter unicorns. You know why? Because unicorns can only be seen by virgins. I'm kidding.

Dave: Nice.

Ted: Until such time, people gave up and they started giving me elephants with tusks. I said, "I don't collect elephants with tusks, I collect unicorns." Suddenly, people started giving me unicorns that are not pewter anymore. There are unicorns up there, but they are imaginary creatures. A lot of the mathematics that supports our science today, which is a language of science, actually came from when we started putting the I superscript or subscript saying that the number is imaginary that actually exploded our exploration into all the other dimensions which, before, were limited by the numbering system that we have.

Dave: I remember back when I was studying computer science, I talked with one of the advanced math professors. He was just ranting. He was so happy that he had this new kind of math he discovered. I looked it up, said, "What do you do with it?" He goes, "Oh, I have no idea." I'm like, "What do you mean you have no idea? Why are you so excited about it?" It's like, are you solving sudoku here? He said, "No, eventually we're gonna figure something out because if the numbers all work out and this new system works, it means something. We just haven't figured it out yet."

I remember at the time as a young, arrogant, overweight kind of angry guy kind of going, "This guy's wasting his life." To him, he was actually finding real beauty in that and probably contributing something that would be incredibly useful to the field of knowledge and just to expand our consciousness. It's always fascinating to talk to really smart people doing advanced math.

Ted: A physician doing advanced math.

Dave: Yeah.

Ted: You said something about beauty. Formulas are beauty, equations are beautiful. I find them beautiful. I'm weird that way, but the thing is, when I went through the lab for the first time, I was asked two questions. I was asked, is consciousness computable? I said, "Yes." He also asked, "Is beauty computable?" I said, "Yes." If I worked with beauty, Dave, I would have been a multi-millionaire many times over before this time, but I

worked on consciousness. The question that I had is, is consciousness an emerging property of complex systems?

Dave: What's the answer?

Ted: I belong to the [emergent camp 00:20:35] because I was working on C. elegans and I was trying to remove ... These was at the days of the internet where you could post a question. I was brute forcing the Navier-Stokes equation, and you know how many solutions there are to that. You post a question on the internet and six Nobel laureates would respond to you. Those are the days of the internet that I miss.

Dave: That was before AOL plugged into the internet, and that day the internet died. I hear you.

Ted: When I was looking at that I said, "Now let me remove the circuits that says, "Now I feed, now I mate, now I move." Is there a circuit that says, "Now I will do this"? I found out that when I took out all the circuits after modeling it, there was no circuit left. It's by putting it together that you could actually find the emergence of this new system. It's like one plus one equals three kind of thing rather than a one plus one equals two.

It mirrors exactly what Daniel Dennett said. He wrote Brainstorms. He was the one who wrote Consciousness Explained, which is criticized as, "That's consciousness explained away." He was the one who posed the question, if I cut off Ted's head and put it on Dave's and cut off Dave's head and put it on Ted, who is Dave and who is Ted? These are the kinds of questions that he was asking.

I was looking at those kinds of problems. Looking at the internet now, I gave a speech sometime in the early 90s. I said, "The main problem with highly networked systems is instability due to noise. I even gave an example [inaudible 00:22:28] what's happening now. I said, "If I fart in California, no one ever has to know about it in Washington D.C. because it's insignificant information." These are the kinds of disturbances that we're seeing now that makes the network unstable, but still, you can see that there's an emerging consciousness of the internet as a whole. No one's regulating it, it's just arising from the complexity of the flow of information within it.

Dave: I love it that you're not just an AI researcher and meaningful tech and mathematician guy, but you're also a physician. One of the reasons I wanted to interview you is I have a theory and I want to run it past you. I wrote headstrong and dug really deep into mitochrondrial biology and how mitochondria make decisions. I also read a book that ... Honestly, I say I read it. I can't say I digested all the equations. They were over my pay grade, but Stephen Wolfram's book called A New Kind of Math.

Ted: Yes. It's still on my nightstand until now.

Dave: It's a great way to fall asleep if you want to fall asleep. If you're listening to this, you probably missed this book. This is the guy who created a software that most researchers use to visualize equations.

Ted: Mathematica.

Dave: Mathematica, exactly. He kind of was a little bit crazy, I think you could say, in a good way. Locked himself in his bedroom for two years and wrote this book. What he said was, "You can take almost any form in nature, and you can replicate it with a few simple rules repeated almost infinite numbers of times." He said, "Here's the flower. It looks so complex, but it's really just these three things. You just have to do them an unfathomable number of times." Basically, beauty or other forms emerge from what looks like dumb little rules.

Ted: Yes.

Dave: I spent a lot of time looking at consciousness. I run a neuroscience facility that trains people to have their brains work better. What I came up with was a theory. I don't know anyone else on Earth I could bounce this off of just so directly. I'm just gonna ask you.

There's an operating system for a bacteria. They're pretty stupid, or yeast, whatever, any single-cell organism. It goes like this. Run away from killer, hide from scary things so you don't die now, eat everything so you don't starve to death, and then reproduce at any cost so the species doesn't die. Then I look at our ego. Our ego is pretty much run on those three things. All of us, everything we do we don't like ... All the things we struggle against are coming from those three things.

I've come to the belief that our ego is an emerging property of mitochondrial biology, where the mitochondria are the smallest fastest cells in our body. There are so many of them making micro decisions, literally quadrillions of them making millions of decisions a second, with an emergent behavior that looks like, I'm gonna run away from that scary thing, or I'm gonna eat the cookies. I'm gonna have sex with everything that's not a cookie. Those sort of things are the ego urges.

Ted: Right.

Dave: Is that a meaningful, useful framework or thought or does that totally violate your connectome research?

Ted: No, no. Let me put it this way. You touch on a fundamental question that I always ask scientifically. Forgive me for verb-izing a noun, but the question I ask is, what gets fractalized? Whether it be a process, a structure, what gets repeated over and over? That's the main question that I have always asked from the beginning. Behavior, be it whether you're building something, be it when you're teaching, when you're learning, how the brain works, how energy [inaudible 00:26:16] works ... I subscribe to the holobiont theory, where just groups of species from organisms that are working in synergy with each other.

You can touch on the one thing, what I said. Ian Stewart said something that actually could get me depressed, and it got me depressed for three months. He said that, "What if we are just in a grid, all of us?" You are alive and you're lit and we just followed simple

rules. If the pixel next to you ... You're a pixel and the pixel to your left is lit, then you're being lit. If the pixel above you is lit, then suddenly dies out, and the one to the left dies out, you die out. That was in the game of life.

You're familiar with that [inaudible 00:27:06] Princeton. Just by four simple rules, they're able to generate beautiful flowers, and landscapes, and gardens, et cetera. In fact, they use fractal programs now to generate alien landscapes in movies. That actually sends me to depression because what he said was ... Because he calls each of these squares cells. He said, "Then for every little thing like the mitochondria creates its own deuterium depleted water, let's give yourself a Nocell award for that.

For me, it's a very useful construct to see what gets repeated over and over. In your reference earlier, Nassim Haramein's point is that, what is a [inaudible 00:27:59] that's stable enough to produce a toroidal structure? Because toroidals seem to be repeated all over and over in the universe in terms of geometry. In your way of the mitochondria, essentially it's not just the mitochondria. Each cell in the body, once you remove its cooperative nature in there, will follow very distinct things. It will want to survive, it will want to produce, it will want to defend itself. Those elements will just grow.

The big bad part of the ego is that not only does it reside in the default mode network of your neural network called the brain, which was just recently a little sedated, it also fractalizes itself into our symbolic self. I call the ego the center of narrative gravity, which is what Daniel Dennett calls the cell. The center of narrative gravity, stories we tell ourselves. I am Ted, I was born here, I am 30% X genetically, and so on and forth.

That we carry, and then that espouses all of our boundaries. That, I won't do. This, I will do. Then suddenly we find ourselves behaving exactly like the organisms that are inside us. That's fractalized organism behavior. You're just been able to probe through the smallest part that's the living organism and just expanded it through this big organism that's synergistic operation of those smaller organisms. It shouldn't surprise us that that same behavior would come through.

Dave: It's interesting you talked about the internet becoming conscious, which is a big complex system. Then we look at the level of consciousness in our body, which is an incredibly large complex system, actually way more complex than the internet, just a single person's body. Then you end up keep going down levels and levels, and you end up looking at cellular biology and sub-cellular biology. You keep seeing this idea of a fractal, like the pattern repeats itself. It seems like it emerges from the very lowest levels of that, and you probe down to where those are. I don't know that we know the lowest level yet, but it's somewhere pretty small.

Ted: Yes. In fact, that was a model that I used in health, Dave. The organ systems, for example, they're all networked to each other, right?

Dave: Yeah.

Ted: Then you go to the specialized function of the cells and you see that all of those, like hormones for example, they're all networked to each other. You touch one node, everything else ... I'm a network guy. I'm a connectionist guy.

Dave: Yeah, me too.

Ted: I look at it in terms of that. Then we have to come to some level where there is some commonality in structure and function among all the cells in order to effect any significant change in the health of a person. Now we come to the level of the matabolome, and that's why I chose the metabolome, but the framework doesn't stop there. The health optimization medicine framework that I created for example, doesn't stop there. You can use, for example ... You can test. The key is if illness medicine diagnoses [inaudible 00:31:12] health optimization medicine detects and corrects imbalances, so there are no claims to the practice.

If we are able to detect and present it to the illness medicine community, "Look, we are now able to test subtle energy reliably, and here are the various mechanisms like we should balance the subtle energy. Then suddenly, you are looking at a different level of connectivity. When you look at that, you're essentially just moving the level from one layer to the other, and each one is just a fractal of the other. The connectivity, the behavior, et cetera, they all remain the same.

I think much of the fight that's occurring ... For example, the thing that we're always confused to dysfunctional medicine, functional medicine is still very much disoriented. They will do these tests, but they will do it in the context of tricking your disease. That's why we don't have any fights with illness medicine at all because, as I said, we have no claims. Whatever effect that you get from balancing your metabolomes is a beneficial side effect. The key here is that you descend, you shift your perspective from one to the other. If the perspective descends from the metabolome to quantum physics, and the world is crazy enough to understand quantum physics, and we're able to test it ... Just a few years ago, the physicists were poo-pooing that idea that cotunneling doesn't occur in biological systems, and they found that it actually occurs in photosynthesis. All of these things are getting upended very, very quickly.

What we need is a level of measure, I think, to be able to measure these things, and then affect ... I'm an applied mathematician, not a purist who delights in equations for equation's sake, but what does it translate to in terms of usefulness, in terms of raising the consciousness of everyone else into this planet to be kinder, more cooperative, less worse? If you change that, if you change [inaudible 00:33:26] perhaps then the entire network changes also in its vibratory rate.

Dave: I could not agree more with that statement. For you, if you're listening to this, that's a profound statement. What it implies and what I've certainly found in my own explorations of consciousness in Tibet and all the other things I've done, as well as just direct experience either with ayahuasca or neurofeedback and whatever, when you change how you interact with the world, it has a very meaningful impact on all the people around you. One of the reasons I even started Bulletproof, of those three

mitochondrial behaviors, the hunger one, it's hard to be nice to people when you're hungry all the time. If you eat stuff that makes you hungry when you're done eating it, you act like a jerk.

Certainly, my whole experience as an obese person, I think [hypoglypegy 00:34:15] might have been the perfect description for the way I was most of the time. So yeah, I was a total jerk, but it wasn't that I chose to be a total jerk. It was that it was happening and it didn't feel like I had control. When I'm well-fed, I'm nicer, and that seems like the lowest hanging fruit to fix our broken food supply, which can increase everyone's consciousness. That lets us have more energy to work on that, not being afraid of things that aren't actually dangerous. Maybe we can make the world a better place just by being a little bit nicer to the people around us. I'm hopeful of that. That's my thesis.

Ted: Interesting that you said that because my BFF here in Washington D.C. is the founder of Socially Responsible Investing. He started it in 1983. It's now called Impact Investing. He's the one who taught me everything I know about finance. It's why I have this kind of social consciousness. He gave a speech in Davos at the Economic Summit, and he starts with me and my advice to him. He said, "I have a friend who says, 'When you wake up cranky in the morning, don't blame the markets first because of the ticker tape that you saw.'" He said, "Ask yourself, am I constipated? Have I pooped yet? Am I hungry? Am I thirsty?" Before blaming someone else for being irritable, ask yourself first these questions. Is there any of these biological needs that have to be fulfilled first before blaming someone else for your irritability? That's what I mean. It starts with you, and then your connections actually change as you change in terms of your energetic presentation.

Dave: If you want to change the world, change yourself.

Ted: Yes. What is the saying? When I was young I wanted to change the world, and when I was wise, I wanted to change myself. Something like that?

Dave: There you go. That's a little biohacking thing. Take control of your biology, you might like what happens. You have this really cool background where you came from one field and you went into another field. Do you piss off doctors? You're a real medical professional, but you don't think like a typical doctor, not even a little bit. Although, you have the knowledge base. You think like a network guy who does medicine. Do you get a lot of pushback from some of Western medicine?

Ted: I did a pioneering effort in Asia in the Philippines. I'm there 30 days every quarter. There was an initial pushback in several areas, but not where you expect them to be. Number one is that most doctors just skated by biochemistry and just barely passed it. They never want to visit biochemistry ever again. When I open my mouth, they shut up because then I know my pathways, et cetera, but then I get calls. Something like this, Dave.

Doctor Achacoso, I'm Dr. So And So. How is your vitamin mineral hormone and supplement therapy going to affect my drug therapy for my patient? I said, "Excuse me.

My vitamins, minerals, and supplements have been seen by my patient evolutionarily throughout history, but your drug has never been seen by my patient in history. So you tell me how your drug therapy is going to affect the levels of the vitamins, minerals, and supplements for my patient."

Dave: That has to make a lot of friends from big pharma, right?

Ted: Yeah. Sometimes I get calls. When I'm here in the United States or in Europe, I get calls. My patients, they think that their doctors know how to read their metabolomic results, so they bring their metabolomic results over to their illness medicine doctors. They go, "Achacoso, this is biochemistry." I said, "Look, I don't purport to know how to read your EKG or your EEG even if I know how to, so don't purport to know how to read my metabolomic network." I said, "It's a separate specialty, and you should respect it that way." The pushback has always been that way in the sense that it's a different point of view, but the point of view makes sense to them.

Dave: It makes sense. No sane doctor's gonna read an x-ray film. They're gonna go to a radiologist and say, "You need to look at this," or someone who does sonograms. They have a different vision for that. What you're saying is basically that metabolomics is in your specialty, and someone who looks at this is going to see a pattern that's different than a physician who's a generalist, let's say.

Ted: Yes. All of these things that you mentioned earlier, epigenetics, mitochondria, biogenetics, the gut immune system, the gut microbiota, expletomics, chronobiology, and evolutionary medicine, all of these throw off metabolites, and you should be able to find them in their network. You should be able to do that.

You mentioned something. You did ayahuasca right?

Dave: Yep, down in Peru.

Ted: Okay. Since I'm also trained in pharmacology toxicology aside from interventional [inaudible 00:40:01].

Dave: Awesome. You have the coolest background ever.

Ted: Aside from interventional neuroradiology. I used to say, "I'm trained in pharmacology toxicology. I know my poisons. I'm trained in interventional neuroradiology. I poke brains for a living and I am trained in medical informatics, so I know how to compute for poisons introduced to your brain when I poke them." The key to all of these things is that, having done pharmacology, I look at the lower of ayahuasca. I suspect that it's like LSD. It shuts down the default mode network, allows your alternate networks to go on, a similar effect like so. I said, "I don't like to suffer. I don't do vomiting, I don't do nausea. If you want to suffer and vomit, go ahead, but someone like me should be able to figure out a way to gently deliver it." I was able to develop a system called pharmahuasca.

Dave: Nice. Do tell. I'm sure everyone listening wants to know about this.

Ted: It uses a reversible MAO instead of [inaudible 00:41:19], which is irreversible. It uses a drug, reversible MAO.

Dave: Deprenyl or what?

Ted: No, [inaudible 00:41:29].

Dave: Okay.

Ted: Actually, it's an under-prescribed anti-depressant. I figured out what a nice first dose is to have and the protocol of how to inhibit, et cetera, et cetera. I won't tell where I did this because-

Dave: Yeah, I understand. 200 miles offshore, I got it.

Ted: I did the pharmahuasca consistently, like every two months when I was 50, for about three years. That's why I became crazier than ever.

Dave: Wow.

Ted: There are things that humble you in a lot of what you do. An IQ really means nothing if you don't maintain any curiosity towards anything. The one thing that humbles you a lot in science, mathematics, physics, and all of these areas that I have interest in, is that there are certain things that you cannot know. You cannot know death, for example. There are certain things that aren't knowable. What science does is there's a wall, and what we try to do is we try to push that wall just a little bit more and more to reveal what's more in there. Still, there's a large part in there that's unknowable.

Dave: Right.

Ted: We just know a little bit at a time, and our knowledge is often incomplete, and that humbles you a lot. That's how I take a look at these things. Looking at all these substances that can allow us ... Who was it who said that the [inaudible 00:43:12] as the telescope is to astronomy and the microscope is to biology"?

Dave: Sounds like Terence McKenna maybe.

Ted: Yeah, something like that. I think we're beginning to just do that now in terms of exploring our minds.

Dave: You've talked about the default mode network a couple times. I actually developed some software a while back called Neurominer that no one's heard of. What it does is it trains you to remember what's happening in your default mode network. I'm going to define that for people, and then I want you to tell me where my definition's wrong

because you actually know way more about it than I do. This is part of my learning process.

The way I think about this is that there's something that happens in your mind when you're not doing something. We used to believe that you're either in default mode or you're in an active mode. Then what scientists at Oxford figured out about 10 years ago is that you're always some percentage in default mode and some percentage in active mode. I believe anyway that interesting stuff happens in default mode, and if you can remember that, like daydreams and intuition, things like that, if you can remember it a little bit more, there's probably some value in that. Most of the time, because it's what happens when we're not doing something, we're not aware of it. It's a part of you that's out of your consciousness. Good definition? Bad definition? What's your take on that?

Ted: What's missing is looking at it from, I hate looking at layers, but looking at it from a layered network point of view. I think you could get more distinction because when you look at the default mode network as it is, majority of it is what I call the bio evolutionary information generators and filters. That's a term that I coined when I was 30 years old. I was writing my second book, and when I told the publisher that my audience was doctors, she said, "Doctors will read and they promptly shelve the book."

I call them the bio evolutionary information generators and filters, and this is part of the default mode network. It's what keeps you surviving. It's what makes you look for food, protect yourself, and so on. They're always there, there's a vigilance that stays over. That actually bleeds through to the higher symbolic network that's in there. That's still part of the default mode network, how you present yourself symbolically in that network. For me, those are the sociocultural information generators and filters.

You have the bioevolutionary information generators and filters here that's part of the default mode network, the sociocultural information generators and filters here, and then your active network up there. So at any one time, all of those are active or at least a portion of those are active because it determines a lot of ... Remember, it can be exemplified via very simple behavior. If you are going grocery shopping and you're hungry, you're going to buy a lot more food, right?

Dave: Right.

Ted: If you shop sated, then you are actually going to just buy what's on your list. These are things that are subconscious, but they actually define a lot of how we perceive the world. In terms of the DMN, that's how I look at DMN, per se.

Dave: For people listening, if you wanted to have more control over, more awareness of behaviors that emerge from the default mode network, what would you do?

Ted: There's always one thing that I ask people. What's worth doing in one's lifetime? One of them is, what's worth doing in one's lifetime for oneself? For me, it's the development of what I call a metacell. I thought I coined the term, but someone actually did. You see immediately whether or not ... Emotions, usually that rise to the surface, envy, or you're

coveting something, as they arise, then give yourself three seconds taking a look at what emotions they are and whether or not they serve you.

These can be brought about by meditation. I know you're big on gratitude meditation, but for me, I'm big on what I call the how-to meditation, which is my meditation in the morning, the History of the Universe meditation. I imagine the Big Bang. I imagine this entire symmetrical universe and then a big bang, then galaxies form, then the whole universe forms. I'll come to the Earth, and then there's evolution, and then a second before midnight, man comes out. Then here's me, and what problems do I have? Suddenly, you have this big perspective, and you're looking at yourself from the outside as a product of all of this. You're better positioned to take a look at yourself and what's going on in the inside.

That's a technique that I use. Just imagine how small you are and when you imagine that, then things going inside you will not impact your ego as much when you think of it that way.

Dave: That's a really powerful meditation. You mentioned pharmahuasca and ayahuasca. I've actually had more profound visionary experiences from doing just really intense neurofeedback, like dissolving into the universe, things that probably many spiritual traditions would call past lives. You could describe things like that as entirely made up. Whatever you want to call them, but just very powerful visions more so than from the pharma side of things just from visualization and just from, I believe, probably turning down the default mode network using feedback to do it.

For a lot of people it's like, I did breathing in my yoga class, or I did a 10-minute audio course, or something like that, but there can be some really profound things that happen. Usually, it involves a teacher teaching you how to do it. Did you get taught that thing or did you come up with it yourself? Where did that emerge from?

Ted: A lot of it emerged from my research and my curiosity about things, and of course a study of a lot of the traditions worldwide on energy and energy healing. I'm an informal student. I always am very interested in shamanic healing all over the world. These kinds of things, they sort of emerge almost organically from all of these studies because you're able to piece together all of these different parts of it. Interesting what you said about your feedback providing the same thing. It's actually a very simple technique, now that I remember it, that the listeners can use.

When you go close your eyes and meditate, you're supposed to focus on your breathing. We are so fucked up. We have so protocolized meditation saying, "It's for reduction of blood pressure, and reduction of stress, la la la la." No. Let's go back to the original purpose of meditation that is done in the traditions of the east. It's to allow the awareness to come in. When you close your eyes even just for a couple of minutes and focus on your breath, just ask yourself one question over and over. Who is it that breathes to you?

Instead of who is it that's breathing, ask who is it that breathes you? Who is it that beats your heart? Suddenly, the ego goes away because those are totally automatic systems in a scientific view, but it's that awareness that actually is beating your heart, that's breathing you, and so on. If you just keep on asking that question, who is it that breathes you, over and over, you will come into that awareness, that sense that this is a meat avatar that you're occupying, that you have, that you take care of, that you have fun with, or that you scream at your kids with.

Dave: Do you know how unusual it is to be interviewing an expert in metabolomics asking the question of, who is it that's breathing you? Thanks for just having a brain willing to be constantly curious. You bring up something that I've noticed. Many of my very favorite healers, particularly physicians, kind of secretly have relatively advanced meditation practices, but they oftentimes don't necessarily tell patients or colleagues that, "Yeah, I do this on a regular basis and maybe that's part of why I'm better clinically than someone who doesn't do this," not that they have that kind of an ego, saying I'm better than others, but why am I successful with patients? I don't know, sometimes I just know something and I'm going to treat it because I just know, and it's because of that practice. Do you think that that's actually prevalent in top physicians, in top inventors, and people in their fields?

Ted: I think so. Actually, I have two stories with that. I was lecturing on epigenetics once, us throwing off metabolites that can be detected, and it was then only there that the physicians understood the connection of exercise, meditation, stress reduction, et cetera on the epigenome. That's why you could measure metabolites. Once they found that link to the ... Oh, it could be explained by epigenetics, once they found that link, they were able to bridge immediately the value of yoga, meditation, exercise, and so on and so forth without all the other bigger things in the macro scale. On a cellular level, they were able to see. Then they understood, "Oh my God, this is the first time I'm understanding the connection between meditation and health."

On the other hand, I'm training doctors and practitioners in health optimization medicine. I've trained them in the Philippines, I'm training currently in Canada and here in the United States. A couple of them were very bright. One of them in the car said to me, "Dr. Ted, I think I know why your patients are getting well. It's not with the hormones, and nutrients, and anything that you give them. It's because you have a gratitude meditation that you practice every morning."

In the morning, I have a gratitude meditation. All my patients, whether or not I hate them or not, clinically, I flash them in my mind, they float in my mind. I'm grateful for them, I'm grateful for their great health, or I'm grateful for their healing, and I pass them through. He said, "Dr. Ted, you're simply energizing them." These hormones [inaudible 00:54:34] are simply a prop. There's that one part that they're actually teasing me about, but I said, "These things that you give, there's the induced certain vibratory states into patients to change their well-being. Those molecules, those vitamins, those minerals, those supplements, those hormones, they do change the vibratory state of being.

You're doing it this way in terms of the body, you're impinging on the body itself, but you know as well as I do they have ... There are many energy healers around the world that will do work on the energy first and then the illness goes away. That's the other way of doing it.

Dave: It's not necessarily an either or. What I've just come to to learn over a couple decades of paying attention to this is that the people who are most effective as healers do both. There are some profound energy healers who seem to be able to touch someone and they get out of a wheelchair. I haven't experienced that myself, but I've known people who have had that kind of experience. I'm not gonna deny it. I'll say it's highly unusual. There are people who do straight up chemo, and remain angry at the world, and they get healed, and everything's fine, but it seems like if we're gonna play the odds, you probably want to just do everything that might work all at once instead of just choosing one.

Ted: That's what medicine's about. Medicine is neither a science or an art. Medicine is a trade. We get paid for our services. It's first and foremost a trade, so it's pragmatic and eclectic. Whatever works for the patient, we use for the patient. I think that's the confusion about medicine right now. Most people think it's a science, an art, blah, blah, blah. No, it's a trade. It's very pragmatic. It will take from as many disciplines as it can in order to heal the patient. That's always been my point of view.

However, if you want to make a change in terms of removing illness from the equation and focusing on health, as I like to say, if the World Trade Center was never bombed, you will never see the great lengths that was done in order to prevent the bombing. That's what we're trying to do in health optimization medicine. The bombing is the disease. All the things that you do to prevent that is your preventive medicine, your health optimization, your maintenance of your engine, your optimization of the engine. In order to get it accepted by the illness group, one, I make no claims, of which I'm very strict about, and number two, it follows the same framework as they do, diagnose and treat, detect and correct. It's the same model. You present a level of measurement.

An example I could give is my mother. She passed away last year, but at 86, I took over her care. She was [seven 00:57:21] two years wheelchair bound. In six months, with hormone and nutrient balancing, she was able to walk with a cane around her garden. That's the kind of ... It's not the "I heal you now and you start walking out of your wheelchair," but something that's more "medically or scientifically acceptable" in that regard where, after six months, she's able to pull herself up. She was 86. At 87, she was able to get herself a 77-year-old boyfriend. Hey, you know. That's a miracle in itself.

Dave: Yeah.

Ted: That's what I'm saying, is that if you cast it in the framework where it could be more acceptable, where it could be used and incorporated into illness medicine practice as part of their foundational practice, then it would be great, but if you do not like it, they could just refer the patients to us. We know how to do it.

Dave: Spoken like a classical disrupter. If someone, whether they're a medical practitioner listening or someone who is just interested in learning more, how would you go about measuring your metabolome? What are the tests that you look at to help understand what's going on in a patient?

Ted: Currently, the tests that I use are made by Genova. They have the NutrEval, which is from urine, and they test your levels of vitamins, minerals, and so on. You could get the plasma amino acid levels also. Then I also take the GI Effects, which is stool, to see whether or not you have any leaky gut, and then to see the profile of your gut bacteria and what metabolites are actually throwing inside your body, your levels of short-chain fatty acids, and so on. Then I also take the gut sensitivity testing to see what foods can be removed in order to decrease your molecular inflammation.

I know there are a lot of pros and cons about doing this, but it's the best that we have right now, and it works, so why not use it? Let's be pragmatic about it. Let's not fight about the tests. If they work, if there's an improvement in the future, sure, great improvement. I take a look at those levels, and if there's a borderline toxicity, you take it out. If there's a subtle toxicity, take it out, borderline deficiency, you put it in.

Remember, I'm looking at values ... The "normal" values are not relevant to us. We use optimal values. Optimal values are those found at age 21 to 30. I use 30 because at 30, testosterone levels in men drop. That's what I use as my gauge, 21 to 30. Interesting Dave, that tour three years ago, there was a 60,000 [inaudible 01:00:26] that was presented in Europe where they found out that even men aged 21 to 30 were experiencing erectile dysfunction from endocrine disrupter chemicals, the chemicals found in the environment of their endocrine systems or hormone systems, causing a drop in testosterone. That was a very interesting study.

After that, after comparing, then you try to move the entire network. Here's my network background. I tried to move the entire network of hormones and nutrients over to when you were 21 to 30. That's the science of it. You cannot just move one because when you touch one, the rest of the network will move. I call that network-wide range shifting. You shift the entire network. The mistake that we made, even anti-aging medicine for example, made many years ago is that they gave hormones singly. You give estrogen unopposed, of course you'd get breast cancer. You give testosterone unopposed, you get all sorts of side effects. You have to move the entire network because all of them balance out each other inside the body. You have to move the entire network.

That's the science, but the art of it is if the patient already starts feeling well and says, "I am good at this level," then you stop at that level temporarily until you remeasure. For the first year, I recommend that you get measured every three months, second year, every six months thereafter. This is how you invest in yourself. You're investing in your health by doing this because no illness medicine doctor is going to do this for you.

Dave: Very well said. If someone came to you tomorrow and said, "I want to perform better at everything I do as a human being," what three pieces of advice would you have for them?

Ted: Okay, Dave. I'm prepared for this question. I always am asked, "Dr. Ted, how do you live your life?" I say, "I live my life like a video game," and the video game has three components, life, health, and time. Life, I only have one of them. In your video game, you can have as many lives, but this is the only life we have. I don't place myself at unnecessary risk. True, I'll go bungee jumping, I'll go skydiving, but I'm never going to chase that guy who just cut me off the road, because humans are uncertainly dangerous.

Dave: Don't get killed by a human, got it.

Ted: In fact, there's a saying. You cannot get killed by ghosts, but you can get killed by a human. The second is health. You know in Pac-Man where you eat those cherries, et cetera so you get stronger and healthier? Be healthy, do things that will make you healthy. You provide a lot of advice of being healthy. One of the most difficult things that was asked of me is, how does health optimization medicine make you spiritually healthy? This was asked of me by a psychiatrist. Spirituality is a component of healing. I said, "You know, that's really very simple." The DMT is a spirit molecule. A lack of spirituality is called a DMT deficiency syndrome. Get DMT and the ball starts rolling.

Anyway, not only your physical, emotional, and mental health, but also your spiritual health and your energetic health, and then time. I alluded to this earlier. How do you want to spend your time? There are two things that I ask myself. What's worth doing in one's lifetime? As a person, and for me that's development of a [inaudible 01:04:24] all the time so you know when to engage and not engage in particular situations. That's a continuing practice.

The second is, what's worth doing in the service of the planet Earth, other people, other creatures? That's not just you. You belong to an entire network of beings here on Earth, and we all just currently have one planet that we live in. What's worth doing in the service of other people, creatures, and the planet? If you decide what kind of time you want to spend, and spend it in high quality, then do that. Do that thing that you love and you're passionate about.

In scientific [inaudible 01:05:08] Dave, I would like to translate that to something that's more very simple. Don't fuck with my time, and I won't fuck with yours.

Dave: Amen. I love that one.

Ted: Life, health, and time, my life as a video game.

Dave: I love it, and it's very pragmatic, and also leaves a lot of room for exploration in each of those fields. Particularly, the not dying is really good. I talked a long time here ... One of the first 100 interviews was with a physician. I want to say it was ... Actually, it wasn't

even in the interview, it was before the interview. We had this conversation about not dying, and one of them was drive a heavy car, like physics. Some other driver's gonna do something bad, you want to have mass behind you when that happens because your odds of living longer just from that go up dramatically. The other one was leave flying to professional pilots. If you're flying an airplane and you're not very good at it, your odds of dying go up dramatically. The whole not dying because you don't get a do-over, I think, is underrated in what a lot of us choose to do with our lives.

Ted: While I do fly planes, the flip side question to that is I'm always asked, "Dr. Ted, how do you want to die?" Before, I said, "I want to get assassinated because only important people get assassinated." Now, I've changed that, Dave. I said, "I want to die in the middle of an orgasm. That's the best way to go."

Dave: I've had both answers. Where I am now, I'm gonna live to 180 or more perspective, is I'd like to die at a time and by a method of my choosing, which includes orgasm is just fine.

Ted: I hope it's at a push button orgasm, like oh.

Dave: Yeah, hopefully a long good one. I'm with you there. Ted, thank you so much for being on the show. People can find your work at healthoptimzationmedicine.org or biobalanceinstitute.com. Anywhere else they should go to learn more about your amazing body of cool stuff?

Ted: Yeah. If they can just Google "Dr. Ted Achacoso" and at YouTube, they would find all of my crazy stuff over there, other podcasts, lectures, and so on that I give, and trying to convince illness medicine physicians to shift more to health rather than just focusing on disease, like getting away from that "If it ain't broke don't fix it" mentality while it's breaking. They just don't see it yet. Let's prevent that breaking. That's the theme of much of my lectures out there, like molecular information, mitochondria, microbiota, vitamin D, all those sorts of things that doctors don't want to pay attention to and that you pay attention to, Dave. To your credit, you're actually one of my inspirations-

Dave: No way.

Ted: Yes, for this framework. If someone like you are able to bring in the level of thinking of the people who listen to you to this level, then they will be ready for this kind of management. Illness management is about decease management. Health optimization medicine is finally about health management, and that's what you want to do.

Dave: Beautiful. I am grateful for your body of work, and I love the network perspective on medicine. I think it's largely lacking because it takes a good amount of time to think in networks. For me, I had to learn how to be a teacher. I taught at the University of California in the Web and Internet Engineering program to learn once you have that way of thinking, you can't really go back. It tells you how to influence a complex system and, like you said, single molecules oftentimes aren't the one answer. You have to do more than one thing at a time. Thanks for your limitless curiosity in your work, and I think you're making a difference.

Ted: Thank you, Dave. It's perspective, always. It's what any mentor and any [inaudible 01:09:25] broadcaster worth his salt can do is to shift perspective. That's what a good mentor does, that's what a good guru does, that's what a good healer does, and that's what a good person like you does.

Dave: Oh, thank you. If you liked today's episode, you know what to do. Go watch one of Ted's videos because they're really cool. Head on over to Amazon, leave a review for Headstrong or leave a review for the show, or just do something nice for another person today that makes the world a better place a little bit more than you might think, at least if you believe that we're all in a big network, which we are. Have an awesome day.