Introduction and Ari Whitten's Background

Welcome to the Broken Brain Toxic Gut Summit. I'm your host, Jason Prall, and joining me now is my good friend Ari Whitten. And Ari is the founder of the Energy Blueprint and the bestselling author of The Ultimate Guide to Red Light Therapy and Eat for Energy How to Beat Fatigue and Supercharge the Mitochondria for All Day Energy.

Ari has a Bachelor of Science in kinesiology certifications from the National Academy of Sports Medicine, as a corrective exercise specialist and performance enhancement specialist, has completed extensive graduate training in clinical psychology and holds a master's of science degree in Human Nutrition and Functional Medicine.

He's a tireless researcher who has obsessively devoted the last 27 years of his life to the pursuit of being on the cutting edge of the science and health and human energy optimization.

You can find his podcast programs and supplement formulas at the energyblueprint.com. All right. Thanks for joining me. Thanks for having me, bro. It's a pleasure to be here.

Can I call you bro? Because we are. Yeah I mean we're there. So yeah, we're sorry for the informality here, but that's how we talk to each other in real life, I guess.

Well, this is Southern California, right? That's right. I think it's like you have to say that. Yeah, yeah. So, you know, I bring you on really to get in the depth in the weeds of energy.

And this is something I feel like, especially as we cross 40, which I'm, I'm now thoroughly in that camp, it can start to dip for many people. This is a natural.

I mean, look, this is aging is a real thing, right? Like we can no longer deny it. We're not living to 500 aging below. Speak for yourself. I get you one of those.

Okay. And and with all that said, we know we now know science is very clear on this topic of where energy comes from, how we can become more resilient.

And that's really your expertise. So maybe, maybe just give me an idea of really how that landed for you. Where where where did you really wander into this world of energy as to make it your thing?

Because I mean, like, you're an athlete, you've always been an athlete. I can't imagine you had this massive, massive fatigue. Or did you? Yeah. Well, I don't know to what extent.

I sort of told you my origin story. Maybe it's come up in one of our past conversations. Yeah, it's it's a good. It's a good question. What you're asking me in, I think.

How long have we known each other? Has it been, like, about ten years at this point? Close to ten years? Yeah. Yeah, it's about right. Yeah, yeah. So, you know, one of the things back in the day that you'll remember, since I know you've been in this natural health, holistic health space for more than ten years.

Is that energy used to be talked about in all of these circles as adrenal fatigue, right? That that was the thing. So if somebody was struggling with symptoms of low energy, of chronic fatigue, it was, oh, it's your adrenal glands.

It's your cortisol. And that whole story has kind of shifted now. It's kind of fallen out of favor. I'd like to think that I had something to do with that.

I certainly know many people in the functional medicine space that credit my work from many years ago, on that

topic with helping them shift out of an adrenal fatigue space.

Well, I mean, I remember you were just, like, pushing. You're like, no, no, this is not right. It's just I know that's the story from the 70s is not right.

It's not right. It's this. I remember that specifically, primarily on Facebook. Back then, it was just like you were, like, going hard on Facebook, like.

Guys. No. Here's the story. Yes, exactly. So, let me let me step back before that and kind of tell you how that came about. So as you said, I've been an athlete my, my whole life.

I've been I got into bodybuilding when I was in my teens and, you know, so I was a martial artist, a soccer player, kind of aspiring bodybuilder. I was super into fitness, into nutrition for enhancing body composition and performance. And that was kind of my world, so very health conscious, very fit from the time I was young.

But then in my mid 20s, I had a stint where I was actually working on a fish farm, and, I, and I got mononucleosis. I got, Epstein-Barr virus. It was initially misdiagnosed as strep throat.

They didn't know what it was. For weeks, I was seeing all kinds of doctors. Nobody had any idea what was going on. But I was severely, chronically fatigued.

I had, like, a massive ball of pus in the back of my throat.

The Adrenal Fatigue Debate and Ari's Origin Story

Where to? To the point where I couldn't even eat food for like, I think 3 or 4 weeks. So I was like living off soup, lost like 30 or 40 pounds, kind of became emaciated.

And then I was left after this with like six months of pretty debilitating chronic fatigue. So I actually did go through this despite being fit, despite being an athlete.

I did go through this very intense period of of chronic fatigue. It was I was also living in a place with, that was infested with mold that might have had something to do with it, the mononucleosis, plus the mold, whatever it was.

I was also kind of partying it up and, not sleeping much. And, and that constellation of, of things basically led to me being pretty debilitated for, for six months, actually more than six months.

In the process, I basically wanted to learn everything I could about, energy and fatigue and, you know, I went to physicians, I saw natural health physicians.

I read everything I could from from people I respected in the holistic health, in the functional medicine space. And basically, as I said, everybody was talking about adrenal fatigue, that that was the thing.

So initially I was like, I was all about it. I was like, okay, adrenal fatigue, that's what it is. I got to support my adrenals here, you know? That's what's going on.

I ended up getting, cortisol testing done. It didn't show any abnormalities, but I was still convinced. It's got to be. It's got to be my cortisol. It's got to be my adrenals.

And then I started to read more on it, and I basically discovered the conventional medical view. And people can Google this right now if they're interested.

But basically, if you look at the conventional medical view of the, the, the, the syndrome, the concept of adrenal fatigue, there are large bodies of endocrinologists, institutes for endocrinology that have come out of public statements, basically saying adrenal fatigue is nonsense.

It's pseudoscience. It doesn't really exist. And initially I was very upset at this. I thought, oh, these, you know, these conventional medicine MDS, they think they got it all figured out.

But really, no, adrenal fatigue is a real thing. That's that's what's causing my symptoms. That's what's causing all these other people symptoms who have chronic fatigue and work like I want to own up to it.

Would you say that there's a bit of an identification with this idea, this concept that you've had? Because I know this is a very common thing. I see it all the time.

Did you kind of feel that? I've I've gone through that myself. Oh, absolutely. Yeah. Yeah, yeah. So not not even to a subtle degree. Let me tell you. The next part is so, so the next part of the story is I was so annoyed with the conventional medical sort of brushing off of the whole thing of adrenal fatigue as pseudoscience, that I actually wanted to write a book, because I was very scientifically literate.

And, you know, I very capable of reading the science and, and writing on the science. And, you know, I was already very much in this, this world of natural health and science, related to natural health.

So I was like, all right, I'm going to write a book, basically analyzing the science, proving that adrenal fatigue is a real thing. And, and I started to explore the science, and first thing that I found was, oh, there's actually if you Google adrenal fatigue on PubMed or Google Scholar or something, basically nothing comes up.

Certainly nothing came up at that time. There's a few things that come up now. And I was like, oh, that's weird, because you can search pretty much any obscure medical condition.

You can dream up even very, very rare medical conditions, and you can find lots and lots of research on it. Yeah. If adrenal fatigue is so common, why is there no research on it?

And then I got creative. I started, you know, putting in terms like you know, adrenal function, HPA axis function, cortisol levels, as it relates to chronic stress or burnout or burnout syndrome, I started to discover that there were terms for other syndromes, okay, there's chronic fatigue syndrome.

There's there's clinical burnout syndrome. There's a number of other, syndromes that are sort of connected to the symptomatically that have a lot of overlap with this idea of adrenal fatigue.

And, and then I started to find studies on those conditions, really, and that where they tested cortisol levels, the basic design of these studies are take a bunch of people with the fatigue syndrome and a bunch of controls, a bunch of people without that fatigue syndrome test their cortisol levels, see if there's a difference in cortisol levels. Right.

So basically science 1 to 1. That's what the majority of these studies are, are basically doing over the course about a year of my life, which I dedicated to this, like a full year of basically doing full time analysis of this research, I found about seven, I think, 72 studies, if I remember this is several years ago at this point.

But things like 72 studies in total. This included some systematic reviews of literature and like on chronic fatigue syndrome or on burnout syndrome and so on.

And basically what I found is like one study would show, oh, this one's chronic. This, this one's found that the people with chronic fatigue had slightly lower cortisol relative to the controls.

This one found that the people with chronic fatigue had slightly higher cortisol relative to controls. This one found no difference. This one found no difference.

You know, then the same thing with burnout. And the overall body of evidence basically showed absolutely no clear indication whatsoever that you could say that cortisol abnormalities of any kind were linked with chronic fatigue.

The vast majority of this body of evidence basically showed that the vast majority of people with these kinds of chronic fatigue syndrome or burnout syndromes, or chronic stress have no particular cortisol abnormalities.

If anything, chronic stress is linked with slightly elevated cortisol levels. Chronic fatigue was not really linked with any particular cortisol abnormalities.

So in the process of me writing, wanting to write a book, proving adrenal fatigue is real, basically, I disproved it to myself. I basically concluded that the body of evidence does not support adrenal fatigue, and that the conventional doctors were correct in basically their understanding that, adrenal fatigue is is not the cause of these fatigue syndromes.

Cortisol abnormalities are not the cause of these fatigue syndrome. And at the end of that, well, I went well, if it's not adrenal fatigue what is it.

Because that's the only really that's the only real explanation that anyone is is offering. There is no other science that any no coherent science, sort of scientific framework of here's the physiology that regulates human energy levels, that controls whether you're energetic or chronically fatigued.

And it was at that point that was sort of the catalyst for me deciding to dedicate my life to sort of building out that scientific framework of what is actually controlling human energy levels.

And I know you're we're kind of skip right to it. You landed on mitochondria as a huge, huge component. And I kind of wandered into the mitochondrial world through a different lens, which was longevity. Right.

And I found that, wow, these little organelles that I remember in biology class, we kind of just skipped over, we mentioned them there. They produce energy in the cell, okay.

They power the cell. They in fact, that's what they didn't even say. Produce energy. They were just a powerhouse of the cell. Yeah. You got to remember, that's all you got to remember for the multiple choice exam.

It's not like powerhouse. Mitochondria are the organelle that is the powerhouse of the cell. That's everything you need, which is the powerhouse. Mitochondria. Right. Exactly. C squishy.

That's right. And I remember, like, wow, these things are really, really important when it comes to longevity. I wouldn't say it's the whole picture by any stretch.

There are some people who think it is pretty much all of it, but but I but it landed me on these little organelles being so critically important to the management of the cell beyond just the energy production or the quote unquote, powerhouse.

And then of course, when we connected, we're like mitochondria brothers, like we're just going deep on mitochondria like, hey, yo, this is huge. Like we got to like take care of these little guys.

They are critical. So so maybe just walk me into that. Like, what is it about the mitochondria? And the chronic fatigue energy piece that you that really hit home for you and kind of help you build out this framework?

Yeah. So, so when I said about to build out this, this science basically I started I started exploring different things I knew things about. So I knew a lot about nutrition.

I was like, okay, what is obviously everyone knows that nutrition is, you know, sort of common sense. Nutrition relates to energy in some way. The timing, the food choices, the macronutrients, the calories.

But like, what is that science? What what are the mechanisms. Right. So so I'd spend like several months sort of building out a scientific framework of that circadian rhythm.

You and I were both big on circadian rhythm, like way back in the day when way before it became sort of common knowledge and blue, blue blockers became trendy and mainstream.

And but, you know, so that relates to energy, obviously common sense. We know that how well we sleep relates to how energetic we feel the next day.

Mitochondria, Cell Danger Response, and Energy Regulation

But what are the mechanisms, what mediates that. Right. And so I would build that out. Exercise. Well how does exercise relate to this energy story. And I would build I would spend months building out the science and trying to figure that out.

And eventually I stumbled across the work of, Doctor Robert Navajo, who is, brilliant scientist in actually in the same city we're in in San Diego. He's, professor, MD, PhD at the, at UCSD.

And, he runs a lab for mitochondrial medicine there, which I've had the pleasure of actually visiting him there and getting some, like a private tutoring session from him, which is pretty cool.

And by the way, I just want to add here, like, I don't know if it's Nobel Prize worthy, his work, but it's darn close. Like, this guy is like, he's not just this average research scientist at a university.

This guy's really landed on some unbelievable concepts that open the door. So I just want to kind of throw that in. Absolutely. Totally agree. So I stumbled across his work, which you're familiar with, which is called the Cell Danger Response.

And this was a paper that was centered around a whole new understanding of mitochondria, which is what you were alluding to a minute ago. And basically this understanding is he was it wasn't just from his work.

It wasn't just one paper, about one experiment. It was really a synthesis of decades of work from many researchers and, trying to understand mitochondria and the different functions of mitochondria, from from scientists all over the world.

And he's sort of putting this together into a new, coherent framework of, a new paradigm, a new understanding of what these mitochondria are actually doing beyond just being the powerhouse of the cell.

Right. And the key insight to oversimplify a little bit here, for the sake of brevity and understanding, is they're essentially two key roles of mitochondria.

One is as energy generators of the cell. And this is the one that everyone knows and talks about. Sort of the typical thing that you learn in biochemistry and physiology courses of, you know, how food gets transformed into electrons, how this gets passed down the electron transport chain in mitochondria, and then turned into ATP.

And that's kind of the story. That's the more sophisticated beyond the powerhouse of the cell, that's the more sophisticated understanding of what mitochondria are doing.

But then we kind of stopped. Right. It's like it's like we found that out and it's like, okay, we figured it out. Like we're good. Yes. So it turns out that there's a lot going on with mitochondria beyond this story of the specific biochemical processes involved in ATP, cellular energy generation, they have this whole other sort of constellation of roles as what Doctor Nabeel calls them, the central hub of the wheel of metabolism.

Metabolism in in this way is not something related to weight loss. Metabolism literally means all of the biochemical reactions occurring in your body. So he's saying they are.

When you understand what mitochondria are doing in human physiology, they are the central hub of the wheel of everything that's going on in your body, sort of everything.

All the inputs go through there and then they are this critical sort of regulatory center where that that that's influencing how different aspects of your physiology function.

So part of their design is to sense the outside world, to sense what's going on around them, and then decide what to do. Now when I say decide what to do, let me tell you the two rules.

So one is as energy generators as we've discussed, and then they have this whole other role as essentially cellular defenders. Okay. And this is what this relates to what Doctor Navis is talking about in the cell.

Danger response. Okay. So it's almost like they have their own, fight or flight response, and they have their own rest and digest, kind of like our nervous system.

Like they're kind of doing that same thing. Yeah. Analogous to that. So, essentially they have these dual rule roles as energy generators and as cellular defenders.

And these two roles are largely mutually exclusive, meaning to the extent they are doing one, they are not doing the other. Okay. And this this is the really critical insight.

So the basic process is if they pick up on danger signals, okay, let's say stressors of various kinds, it could be a toxin, it could be a pathogen, could be mono.

Yeah. Exactly. Absolutely. That's so, as a simple example, if you get Covid, if you get a flu, if you get mononucleosis, one of the classic symptoms is, of course, fatigue.

What mediates that fatigue? Why is it that we get fatigued? Why do we have low energy when we are infected with a pathogen, a pathogenic microbe? Right.

Well, this isn't this is for very smart evolutionary reasons. And it very much relates to the cell danger response. Mitochondria are investing more resources, more energy into fighting off this pathogen.

And coordinating a defensive response. And again, to the extent they are doing that, they're turning down the dial on energy generation. The end result for you as an organism is that you feel less energetic.

So that that's the key principle of what's going on. And this is at the heart of it. You know, as I as I said earlier, we can understand that the role of nutrition and how that ties into the energy story or circadian rhythm in sleep and how that ties in or environmental toxicants or exercise and or medic stressors, which I think are a huge aspect of the story.

But everything kind of ties into the mitochondria. They're ultimately like the canaries in the coal mine. They are sort of the most sensitive. They're like exquisitely sensitive environmental sensors that are designed to basically constantly take samples of what's going on in the world around them to determine, are we safe?

Can we be in what doctor Navy calls peacetime metabolism, which is energy generation mode, or are we picking up on dangerous signals on threats? And do I have to turn down the dial on energy generation and shift resources toward cellular defense?

So that is the and when you understand that mitochondria are playing that role and sort of all the inputs come through there as this sort of central hub of the wheel of the metabolism.

That is why mitochondria are of central importance. So, you know, much like our entire system is going to prioritize survival, right. Like that is its its central, right.

Like if you can't survive then what's the point of making energy, right. You're dead. So it's going to always prioritize that. Now I think maybe the logical sort of, understanding here would be, okay, well, let's get rid of the threats.

Right. And this can be trauma resolution and processing there. It can be, getting rid of mold and metals and toxins and these things that are getting in the way. Right.

And that's an obvious solution. And we need to do that. Right. We've talked a lot about that on the summit. Really, really critical. Okay. That's great.

But there's another piece to to Doctor Nebula's work. Right. Which is okay, we can remove the threat. But then first of all, maybe you can speak to damage.

Right. So invariably there's going to be damage that occurs when we have these, these irritants, these threats that, that are doing damage to the mitochondria of the cell, etc..

So there's that component. But then there's also another component. I remember of his work where he kind of mentioned where they kind of get stuck in this mode even when the threat is gone.

So we can't clean up the environment. We have no more metals. We did our work there. But there's we still have this fatigue, we still have this lack of energy production at the cellular level and perhaps system wide.

So maybe you can speak to damaged mitochondria, why that's so critical. And then this other mode of just getting stuck in this sort of survival threat mode.

Yeah, those are those are great questions. I don't know that anybody, including Doctor Navajo, would want to speak for him, but I have had conversations with him.

I don't know that anybody has great answers to them. So I'll tell you kind of in a little bit more depth than what you just described. But having said that, I don't have all the answers to explain everything on that level.

I sort of on that mechanistic level. So the basic idea is cell danger response is ultimately designed to be an intelligent, evolutionarily adaptive response.

Helpful response, as you alluded to, to help us survive and help us better cope with stressors, challenges, pathogens, injuries, various kinds of threats on the system, it is ultimately advantageous for us to feel lower energy if we're trying to fight off, an infectious disease to have lower energy so that we rest more so that we lay on the couch most of the day instead of running around as we normally would, and doing a bunch of exercise or doing a bunch of work.

You want to conserve energy as much as possible so that resources can go can be directed towards fending off the threat. The same is true if you have a severe injury and you need to direct resources towards repairing that injury, you don't want to have to, also have to direct resources to dealing with, the, the energetic demands of doing exercise, doing mental work, having to repair tissues.

You know, I just got done playing two hours of tennis. That's probably not something I want to do. If I'm fighting off an infection. It just makes it harder for my body to, to to fend off that.

It's trying. And in that case, you're forcing it to try to do both. To pick one, either expend a lot of energy to play tennis or to fight the, the, the threat.

Right. And if you're trying to do both, it's it's sort of mixed signals, so to speak. Exactly. So that system has been tuned by evolution by, by millions of years of evolution to be because it's not just in humans, it's in lots of other creatures with mitochondria as well.

It's been tuned for these kind of acute stressors, acute challenges. And there's a cycle, it goes through different phases. And Doctor Inovio has sort of delineated these different phases, that they go through.

And it's it's very it's quite sophisticated and interesting how he's mapped this out. But basically there are phases of

sort of engaging the threat, fending off the threat, and then re normalizing cellular and mitochondrial function.

Okay. Getting back to that piece, time, metabolism, unfortunately, sometimes from from this model, this way of understanding what's going on, sometimes the cell, the mitochondria gets stuck in certain phases of this cell danger response.

They don't complete the cycle and come back into peacetime metabolism. They stay in this cell danger mode. And then we get this is where the chronicity of certain things come from, the chronic fatigue syndrome.

Why you can have somebody stuck there for years or decades, and with many other conditions that have this very chronic element to them, where it just becomes so hard to return to this state of normalcy.

Now, here's the part that gets tricky and that becomes more speculative, where nobody really knows all the mechanisms. But we can sort of speculate through the lens of this, of Doctor Navios framework.

We can say one element might be it just there certain triggers or signals it needs to go through to get from one phase of the cell, danger response to the next phase to complete the cycle.

Maybe it's not getting those signals. Another aspect which you were alluding to is maybe the mitochondria are getting damaged. And so there's this element of cellular damage or chronic damage that is occurring.

Maybe there's a chronic infection, maybe there's some kind of chronic insult of heavy metal toxicity. Those metals are staying in the body. Maybe you're still being exposed to mold.

And so there's still triggers present that are preventing you from, resolving that cycle and getting back to peacetime metabolism. Or as you said, maybe those triggers have actually been removed and you're still stuck.

And this is, again, where it gets more speculative as to why this might occur. I have some ideas. And what's interesting is Doctor Nevo has actually there's like one line in his paper that kind of alludes to this, where he mentions where medic stressors, and I spoke to him when I spoke to him in person at his lab.

I talked to him about it, and I asked him what he meant by this and to to see if my understanding of it was was accurate. And, and it was and basically the idea that he was getting at that he was sort of cryptically alluding to is.

Is that hermetic stress? So like adding, let's just say adding certain kinds of stressors that the body is evolutionarily adapted to exercise, being the most classic example.

But, thermal stress, heat and cold, things like intermittent fasting, things like breath holding. There are several others red light therapy, sunlight.

Provide a transient stress to the system. And the typical way of thinking, especially for somebody who is chronically ill, is sort of to avoid stress and to say, like, let's minimize stress because stress is bad for you.

Stress is just going to make you worse. Which of course, it can. But there's a couple layers to this story. So so one is that these is like the. So let me step back for a moment.

Our biology is has evolved to require certain things in order to function properly. Okay. So we can think of as a simple example like we require certain kinds of foods.

We require. Some of this is controversial now unfortunately. But like so certain macronutrients we require to to functions like fiber, we require to to function.

Right. Right. Certain vitamins and minerals, we required we require those to functions, sleep a certain amount of quality sleep. We require that to function. Well.

Our biology also evolved to require certain kinds of exposure to certain kinds of challenges or stressors on the system and in the absence of those challenges, the system actually degrades.

So by is this kind of counterintuitive for many people? But by protecting yourself, by shielding yourself from certain kinds of stress that the body is evolutionarily adapted to require to expect, you are paradoxically sort of actually fragile izing your body.

You're making it harder for your body to be healthier. The body requires sort of these exposures to like stress tests every now and then in order to keep systems tuned and functioning well.

Why Stress and Challenge Build Resilience

And if it's not getting exposure to those challenges, the system degenerates, the system degrades. A very simple example of this is, we everybody knows that if you lift heavy things, your muscles will be stimulated to grow bigger and stronger.

And everybody knows that the opposite is true. If you've ever broken a bone and you get a cast on your arm or your leg, eight weeks later, they saw off the cast.

You look down and your arm or your leg is half the size, right? The body atrophies, ruthlessly atrophies and degenerates, tissue that isn't needed for survival.

Now, what most people don't realize is that principle is at play in almost every layer of our physiology. It is the physiology is tuned by the demands of the environment.

This is true at the level of muscles. This is true at the level of bones. This is true at the level of the nervous system. It's true at the level of the heart.

It's true of the level of the brain. It's true at the level of the mitochondria. They all tune themselves to the demands of the environment, and they all atrophy and degenerate when demands are low, when there is an absence of challenge or stress on that system.

So when there is a decrease in capacity and performance of that system, there's also a decrease in resilience of that system. And the more the resilience and the capacity of those different physiological systems shrinks and declines, the less capacity for resilience.

There is less capacity to bounce back out of a difficulty out of a cell. Danger response to go back into peacetime metabolism. Okay. So as an example, like think of, think of a, Ferrari with a powerful V8 engine cruising up mountain roads with ease.

Now take try to ride a lawnmower or a, you know, a 1950s moped up the same roads. And that engine is going to be struggling like hell the whole way. Okay, now, when the system is so weak that it's struggling like hell even on flat City roads, that then there is no extra capacity to do anything beyond that, right?

If you try to push the system beyond that, it's just going to explode. The engine will break down, right? So when when our physiological capacity shrinks to that degree, it becomes much, much harder to recover.

So if you think of this in terms of aging, this is the last thing I'll say. And then you get a question in, because I've been talking for a while. So the, the last thing I'll say is like, just think of a common cold or a common flu, right?

For someone who's young or someone who's middle aged, it's a few days of mild symptoms, and then you recover, you bounce back, you get out of cell danger response.

For someone who's elderly and frail and their immune system, they've undergone serious immuno senescence, which just means their immune system has become old and weak and fragile, and they've lost youthful capacity

and performance in that system.

They get the same microbe. Simple cold or flu? Nothing. Nothing crazy. Not covet, not measles, not not Epstein-Barr virus. Not whatever. Nothing. Nothing crazy simple virus.

Most people don't know that. Simple viruses are often, lethal. To people who are very elderly. If you're 100 plus years old, getting a flu or a cold could be deadly.

I think it's like you don't know the specific numbers. Last time I looked, it was like 10% of people die. You know, in those, those ages, when they get a common cold, that's the result that that's the principle of when capacity is low, every minor challenge becomes a major challenge, and it becomes much harder to bounce back from that challenge.

Yeah. I mean, a couple of things come to mind. You know, we both got younger kids, right? So, working on math or working on reading, we got to challenge that young brain in order to be able to grow that capacity to to learn, to read and comprehend.

And then, of course, do complicated mathematics. Right. So this is we see this in the developmental process of all of us humans. We are challenged constantly as kids.

Like that's one of the things I actually take away from being a parent is like, man, like the amount of stuff we got to learn and figure out in this life.

It's just like, mind blown. But as a kid, you don't, you didn't. You just go through it. Right? And so yeah, we're constantly being challenged. That's necessary.

And then the other piece comes to mind is kind of the bodybuilder analogy, right? Take somebody who's never going to the gym, and want to make them a bodybuilder or even an experienced bodybuilder in order to get to that next level.

Well, the only solution is to challenge yourself to such a degree. And then the other side of that is the rest, right? And but too many of us, I think, in these circumstances and rightly, rightfully so, if you've got chronic fatigue or if you're if you're super ill, a lot of times all you want to do is just rest, right?

And that's a natural response, right? But in your work, I know you're you're sort of pointing the finger over here going, you got to do this stuff. Like if you want to get out of this lack of capacity to function and to be healthy and to have energy and to have clarity of thinking and to have a healthy gut, you got to actually build that engine, right?

We got to go from that mophead and we gotta turn that thing into as close to a Ferrari as we can. Right? So talk to you about how you do that. Or you mentioned a few things when it comes to hormone stress.

But but what's actually happening there at the mitochondria level such that we can actually build that bigger engine. Yeah. Great. Great commentary there.

I want to comment briefly on both things that you said. One is actually the first principle that you alluded to as far as educating a child. There's actually a principle that that is known in, in the scientific research, not not very well known by most people.

It's called cognitive reserve capacity. There's another principle called brain reserve capacity. They're they're mostly overlap, even though they're kind of distinct.

The way that they're thought of right now is distinct. They're mostly overlapping. The basic idea with cognitive reserve capacity is the way they actually measure this is a surrogate for it is essentially how many years of education you received in your youth that is, essentially a surrogate metric for how much cognitive reserve capacity that you have.

This is essentially a metric. So basically the way that they found this was they did autopsies on, actually is I'm trying to remember the initial story.

I won't get too bogged down in the details here, but, they basically did an autopsy on a guy who, had extraordinary brain function. And, up until the very end of his life, no decline in cognitive capacity.

But when they did an autopsy on his brain, there was severe degeneration. And then this this led to the original researcher basically sort of, developing a hypothesis that there was some cognitive reserve capacity in his brain that even as his neural circuitry degenerated, his brain had sort of redundancy built in.

There was there was more neural connections to sort of connect the different brain areas. So he found alternative pathways to keep the functions alive and necessary ones, especially as you get to the end. Right?

Yes. Now, in my opinion, this is not actually a great understanding, of what's actually going on. The better understanding is how many years of education, the extent to which you challenge your brain.

Literally builds up. Your brain literally builds up the robustness of that neural circuitry. Your brain sort of grows bigger and stronger, quote unquote, like a muscle would through challenge.

And, what this research has also shown is that, people with higher cognitive reserve capacity have a huge degree of protection from dementia and from Alzheimer's disease, massive from years of education early in life.

Now, what's important about that is you were talking about the early life phase. What also happens after the after age 20 ish for most people is after they get out of university.

Most people, unless they work a particularly cognitively demanding job, stop reading books, stop learning, stop challenging their brain. So there's this big decline in the amount of cognitive challenges in a person's life, especially.

And they don't diversify. Right. Like that's I think most people get locked into what they do and it's become so one dimensional, right? Which is why in the longevity research, it's it's quite clear learning to play the piano at 74.

Right. Playing soccer. Right. Just doing a lot of variety of, of somatic and mental challenges seems to be the key to longevity, health of the brain itself.

You got it. Yeah. Exactly. Right. And there is robust research showing that both early life education and cognitive challenges, as you were just alluding to, later in life, are extraordinarily protective against dementia and Alzheimer's.

And this is kind of like something that doesn't quite fit and mesh with our typical sort of biochemistry centric way of conceptualizing health and disease processes.

Like, we want to see everything in the blood tests and and always is, you know, that there's bio runs. But what we don't realize is like one of the most powerful ways to protect your brain health and to protect against dementia and Alzheimer's is to challenge your brain, not to take some drug to normalize a particular biomarker, or to take a supplement to alter your biochemistry.

But to understand that your brain, the robustness of that neural circuitry, which is essentially the opposite of the degeneration that drives dementia and Alzheimer's, your brain is literally built up through challenge, and absence of challenge literally degrades it, which drives you in the direction of Alzheimer's and dementia.

So I wanted to just point, by the way, to a little side note on that. Like, I just just kind of hit me, this stuff with AI that we've got right now, cognitive offloading.

And in Google Maps, like phone numbers like these are things that as a kid, I remembered 20, 30 phone numbers

at a time, but I knew my way all around town.

I need ten ways to get to the same place. Right? We look, I think those are probably the least the most, like, the least of our concerns. Guess what I mean?

People at school are now and including doctors and medical school are literally just plugging stuff in AI and having I do all the cognitive heavy lifting for them.

Yeah, I know you're writing a book right now too. So that's a that's another, heavy lift that you got to do. Tell me about it. So, yeah. So talk to me about how do we how do we build these engines?

How do we build the system up, especially for somebody who's dealing with maybe not even chronic fatigue, but but obviously that's a big component too.

But just in general, lack of it's kind of a malaise, lack of clarity, foggy thinking, just kind of lack of motivation a little, you know, just kind of fatigued.

Not like themselves. Yeah. So, it's a great question. And I want to come back to what you said about the person laying on the couch with chronic fatigue and how the inclination is to rest.

And this is also reinforced through much of the the common paradigms in the common thinking right now is rest. Take the stress off your body. Let your body recover.

But here's here's the way to understand it. And this is where I'm going to kind of say something that might seem contradictory or that might seem to go against what I was saying before about mitochondria being central.

Key mitochondria are a central key to understand how the body works. But the real layer that matters is the inputs into the system. It's it's not what's going the biomarkers in your blood.

It's not this organ system or that organ system. It's not your adrenals, it's not your cortisol, it's not your thyroid, it's not your testosterone or your Astrid or your progesterone or whatever it is.

It's not anything internal to you. It is the level of the organism, environment, interface. What are the inputs into the system at that level? Because your body is ultimately it is.

It's a complex system that is designed to adapt to its environment. Okay. And it does that by sensing the signals from its environment. If you are not giving it the signal that it needs energy in order to do the requirements of your life, your body has no reason to generate the systems necessary for robust energy.

So if all you do all day is rest and lay out on the couch, the body has no reason to create the structure and the function, the performance in the systems of your body, the mitochondria to generate lots of energy.

And our high performance. I want to, I want because this is really important what you're saying. And I just want to I want to land this, make sure that people don't miss this.

So because what you're saying is you're not just you're giving it the signals. No question. I don't want I know argument that is I'm 100% on board with that.

I've constantly said the environment, it's the environment. It's how we interact with the environment, including our mental and emotional environment as well. Right.

And and what's what really you're saying here is that we can basically build our body like a bodybuilder. We are building systems where there's we're generating new mitochondria, we're generating new systems to power this energy.

That's really critical because we can damage the heck out of our mitochondria. They may not be functioning like optimally that we want, but we can by by including the right signals, we can build new tissue.

Essentially. You got it. That that is the key understanding and there's there's a number of really important insights embedded into this. One is that even if somebody is talking about the mitochondria, they might still frame it as sort of an issue of biochemistry.

Right? Okay. They might they might speak much of the same language that I spoke earlier. The cell danger response and the mitochondria are really important.

And then so what do we do? Well, to help get our mitochondria working we need to really facilitate the electron transport chain. We need to get CoQ10 and B vitamins.

And you know PCU and the and acetyl l-carnitine. So they can shuttle the fatty acids in there. And we need to get these co-factors in so that the mitochondria can generate energy.

Okay. There's some truth in that. But there's a whole big layer that you're missing, which is what we were just talking about, which is structure. So what is being missed by our biochemistry, our disease centric, biochemistry centric, blood test centric, biomarker centric view of human health is structure.

The human health and longevity and energy are very much a matter of physical structure that built physical structure of your physiological systems. Okay, so maybe an analogy here too.

You know, I come from the engineering world. Imagine a production line, right? And the production lines crap, all the equipments, crap, like through the ten steps of the production line, it's all kind of worn and just not functioning very well.

Well, you can keep feeding it amazing raw material through that production line. And what are you going to get out the back end? You're going to get a piece of crap. Right.

And so this is this is to me akin to what you're talking about. It's like we can give it all the good stuff and it may.

Building Capacity Through Environment and Inputs

And that's necessary to if you want to produce a good product at the end, you do need to have good raw material coming in like that, that that is important.

But this is where I think most people get it wrong, is what you're saying. It's like they're just feeding it the good raw material, but the entire line needs to be refurbished.

It needs to be redone. We need new parts. Yes. And this is exactly why the dominant way of thinking right now, what's trendy right now, that's what is perceived as sophisticated.

This sort of biochemistry centric model of metabolic health model of understanding human health is so deeply flawed is is not because it's it's not saying things that are true, but because of what it's missing, what what you're blind to, when you see everything through the lens of biochemistry is you miss this whole element of structure.

So we were just talking with cognitive reserve, brain reserve capacity. We're talking about the physical structure of the brain, how it grows or shrinks.

This is we have a word for this. It's called neuroplasticity. Okay. Well what we're talking the broader principle we're talking about is what I call bio plasticity okay.

And that's a broad umbrella framework to talk about plasticity of the physical structure and function of many, many different aspects of our system. So in the muscles we could call it myo plasticity.

In the heart we call it cardio plasticity. In the mitochondria we could call it matto plasticity okay. They're all plastic. They all shape themselves literally shape their physical structure and function to the demands of the environment.

Let me give you a specific example. It's been shown that the average 75 year old has only 25 to 50% of the mitochondrial capacity of a young adult. Okay.

And there's two things that happen as far as might or plasticity. Negative might or plasticity, which is the atrophy and degeneration of the mitochondria if you do not put demands on them, bio energetic demands, if you do not require your body to create lots of energy through challenging the body to create lots of energy, and those systems atrophy and shrink in the same way that muscles do, you lose the capacity, the muscle, the mitochondria shrink in size, and you, they literally die off you.

You lose mitochondria. So, most people will by the time they get to their 70s, they have roughly 50% of youthful mitochondria levels of mitochondria in their muscles.

This hasn't been tested in other systems like the heart or the brain. But most likely that would also be true there if you tested it, if you took biopsies the way that we have in muscle tissue, and what's critical about this is we know that this is not just the aging process, quote unquote.

This is not just the passage of time. It's not just some genetically predetermined, immutable process. We know that people who are lifelong athletes do not lose 50 or 75% of their youthful mitochondrial capacity.

They have the same mitochondrial capacity as young adults do. So the presence of challenges to that system creates a signal that creates mightve. Plasticity, which preserves or builds, can even create mitochondrial biogenesis, can even rebuild new mitochondria from scratch, stimulate mitochondria to grow bigger and stronger, and you get growth in that system through challenging the system, through allowing your body to sense that essentially, in order to survive the demands of this environment.

I need to tune up this system. The that's the key, the key insight that people need to get. Yeah. And I think about it like a, like an athlete. Right.

Somebody says, okay. Is are you fit or is that guy fit or she fit? And then my question is, what will fit? For what right am I fit to run? Ultramarathon? Absolutely not.

I have not produced that signal to my body to adapt to that level of stress or requirement. Right. Am I fit to win a bodybuilding competition? No, I have not put my body through that level of stress.

And so when we when I, when we sort of take that and we say, okay, am I fit to function as a thriving individual every day or maybe not. So that's what's required.

We've got to give it the signals so that we can adapt to that level of function. Right. And so how do you take your your members, your audience, your students, through that process of recovering from fatigue to be fit, to just thrive individually as an individual every day in normal, everyday life?

Yeah. Well, that's a long answer. You sure you want me to go ahead? But give me the bullet points. Give me, give me, like, the highlights right now. What?

How do you how should people think about this? Yeah. So, we need to we need to focus on this. The level of the organism environment interface. So this is where you and I are aligned, where and where I perceive much of the common thinking, and the dominant paradigms that exist right now to, to not be aligned so much.

There is this kind of confusion and everything is centered around biomarkers and trying to modify them into normal ranges. And in my opinion, it's just not the right way to think about health on a very fundamental level.

And it creates this kind of confusion where people start to believe that the biomarker is itself the cause of their

problem, rather than tracking it more upstream to understand what were the factors that led to this biomarker being abnormal, being out of range, and it's like becoming masters of biochemistry instead of masters of your environmental interface.

That's right. Instead of masters of understanding what the human organism actually needs, it's essentially a kind of an attitude of hacking, of like, how can we peer into this system, find chemicals, biochemicals and mechanisms that are associated with different outcomes, and then we create a drug or we create it at some kind of, maybe a natural compound that pushes this mechanism or pushes this, this marker into the right level to, to get this effect.

And it's just fundamentally the wrong way to understand human health. And very few people get this, I like having this conversation with you because I know you get it.

So look, there's there's a whole nutritional layer to this story, which is, you know, I wrote a I wrote this book, see if you can get it or not. Can't focus there it was.

Eat for an energy, which is basically, you know, 300 pages describing the link between nutrition and mitochondria. Another book could be written about circadian rhythm and sleep and how that ties into the story.

Another book could be written on environmental toxic toxicants. The book that I've been writing for the last two years is all about physiological challenges, what I call physiological challenges, what most people might refer to as hermetic stressors, which I don't think is a great term for for a number of reasons.

But basically how these challenges, do exactly what I was just describing tune the system, the physiological systems of our body to be more robust, to have higher, more, higher capacity, higher performance and more resilience.

So those are those are the key layers to the system is understanding what is the human organism actually need to function and perform at its best. And the real story of human health is is less one of something you can find in a vial of your blood, and more something that you find at the level of how you live.

Beautiful. All right. Well, this has been great. I feel like we could do another, we could do a whole series on this, to be honest. And I know you have a podcast is basically dedicated this to this topic because there's so many avenues, so many lanes to go down and to go to go deep on.

But I think that the ultimate message that I want people to take away from this is that we've got to challenge the system. We've got to create new physiology.

We're adaptable creatures. We're probably the most what I probably we are the most adaptable, complex life form on this planet. And so the question is, is what are you adapting to?

And this becomes I think this will hopefully this shifts a few paradigms that if we want to get out of this mess of fatigue and malaise and foggy thinking that we have to challenge our systems, we've got to challenge our physical body, we've got to challenge our mental body, and provide the raw inputs.

And I know you have a supplement line which, which supports that side of the equation, and you have a whole educational line which, which really supports the bulk of it, I would say.

Right. I think we're in agreement with that. It's 80 to 90% of the equation. And we got to get that right. And then we can give it the good raw materials to support that function.

So again, this is I think it really is a paradigm shift. And maybe just want to throw it to you for a few closing thoughts on on kind of main takeaways that you want people to to take away from this talk.

I think your closing thoughts were beautiful. I couldn't have said it better myself. So, you know, I think it what to to echo what you were just saying, basically, we want to start thinking about human health less through the lens of

how can we hack our biochemistry and more from this frame of like, what are the signals that I am sending my physiology?

What are the signals? I'm sending my brain on how robust it needs to be, how robust that neural circuitry needs to be. Is it growing or shrinking? Based on what I did today?

Is it is it stimulated to grow neural pathways or is it was it unstimulated and therefore is going to atrophy and degenerate and move me closer towards dementia, dementia and Alzheimer's?

Same for my muscle, same for my bones, same for my heart, same for my mitochondria. Right. There's a whole psychological dimension to this as well. But what are the signals that I am sending to my body?

Are they ones of growth or decline? Yeah. And I again, I because I think like like you I, I love throwing the weights around and being in the gym and it I can draw simple analogies from that, you know, and there's times I, I haven't been in the gym in a while and I'll go in and, and I feel weak, you know, I'm pushing weight around, but I kind of feel weak.

And if I stay consistent, I'm in there, consistently and I put work in, there's an aspect of I just feel strong and I know this is how it is. Same thing with mental function, same thing with emotional, you know, the emotional body is like there's a challenge in going through some of this stuff.

And when you come out the other side of that challenge, you just feel strong. And in this case, I would say antifragile, right? To kind of borrow some of your language here, it's like, that's what we want to become physiologically.

We want to become antifragile so that when we face these inevitable challenges in the world, be it Covid or, the flu, that we have a system that can handle it, that can respond in function and just the demanding aspects of life, right?

Whether you got kids, whether you got a demanding job, stressful financial situation, we want have that anti fragility built into our system so that when we face life's challenges, we feel strong, we feel robust and we can get through them.

Yes that's exactly right. And I know people, I know people in my personal life who who are afraid of stress. Yeah. And this could be a whole other conversation because there's a lot of interesting data on this, and there are a lot of misconceptions about stress and how it affects human health.

I mean, even psychological stress. But, to to echo your point about anti fragility, and this is a term, coined by Nassim Taleb and basically the idea that stress not only, you know, it's, it's one step beyond resilience.

It's one step beyond just bouncing back to some state of normalcy, or some baseline state. It is actually the growing stronger from exposure to chaos to challenge, to stress.

And that is is what we need to strive for. And when you have that, you know, in contrast to certain people I know who are who literally who very, very much fear, stress or when they have to have stress, they're very focused on how it's negatively affecting them and how it's harming them and so on.

This is, an attitude of fragility, one that's been sort of indoctrinated into us over many years of media reports of how harmful stress is for us. But it is it has made many people fearful of stress and challenge in their lives.

And what we want to cultivate is exactly the opposite. We want to cultivate an attitude of like, hey, bring it on! Like I know life, especially you and I are raising little kids.

We're running businesses, we're working hard, trying to write books and, you know, and produce summits and educate people and and, it all entails lots of challenge and lots of stress.

And it's so much better to go through that with an attitude of anti fragility, of knowing that you're getting stronger the more that you go through these challenges, rather than the typical sort of fear and anxiety about having to go through stress.

Yeah, and I still face my every day things I'm afraid of tackling and it's like, but but I think it's through the practice, right, of facing that head on, of going at it, of, of this mindset of like, yeah, it's kind of hard and I'm not sure if I'm going to how I'm going to do on the other side.

But but pushing through that builds this confidence. And I think that's what we want to build in our system, in our body. Right? We want to be confident in our body that it can handle things.

So we can we can we can go on for hours. I love talking to you. We're on the same page in so many ways, philosophically and how we approach these things.

Always great to hear, how your mind works and what you're working on next. And I know you got a book coming out in, probably about summer next year. It sounds like this kind of two.

I told you I made one of the most horrendous mistakes of my life by taking on two books at once. So I have two books coming out about one one early next year, and then one, I think, in July or August or something.

Careful what you invite into your life. Oh my gosh. Yeah, that's so funny. Well, you're you're you're walking testament to your message here as you just hopefully it makes me stronger.

Exactly, exactly, exactly. We'll tell people again where they can find more your work, your supplement line and some of your programs. The best place to go is the energyblueprint.com.

Well, well, there's tons of stuff there for everyone. And, our gets into brain health, gut health, energy. You know, these are so intricately tied to all the important systems.

And that's really where our likes to focus is on this big lever. So, again, thanks for taking, a few minutes out of your, your crazy book writing, schedule to to join me today.

I. Yeah. Thank you so much, Jason. Always a pleasure.