Introduction to the Longevity Summit Interview

Welcome to the Longevity Summit. I'm your host, Doctor David Jockers. And today I've got the privilege and honor of interviewing Ari Whitten. And we're going to talk all about how to enhance mitochondrial health, the secret of Hermes, and how to optimize your body's inborn ability to produce energy so you can live a long, healthy life.

Now, Ari is a founder of the Energy Blueprint. He's a bestselling author of The Ultimate Guide to Red Light Therapy and Eat for Energy How to Beat Fatigue, supercharger, mitochondria for All Day Energy.

Some wonderful books that you guys can check out. 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 on health and human energy optimization.

And you can find his podcast programs and supplement formulas at the Energyblueprint.com. You guys are going to love this interview. Some really great information.

Ari is so well spoken and well researched, and he is a favorite of my community, my audience. And so with that, let's go into the interview. Well. Ari, always great to connect with you.

And, you know, a lot of our audience, they're concerned about aging and they're concerned about some of the symptoms of aging. And obviously they want to promote their overall longevity and thrive into their 80s 90s and, you know, possibly even into their hundreds.

And one of the big things people start to notice, you know, today's day and age more and more when they're young, but particularly as they're getting older, people will say they just don't have the energy that they used to have, and they're dealing with fatigue.

And so what are some of the major causes for underlying chronic fatigue issues? Yeah, it's a big question. So I'll do my best to answer it very, very succinctly first.

And then we can delve into sort of more aspects and nuances to that question as we go. Sort of more limbs of the branches of the trees. I had a personal experience with with chronic fatigue when I was in my mid 20s, and that's what led to my interest in this topic, because I've been interested in health science since I was a little kid.

Chronic Fatigue and the Mitochondria

Actually, we were just talking about it prior to starting this interview, but we were both athletes growing up. And, you know, my interest as an athlete, as an aspiring bodybuilder, I was a I was a soccer player, I was a martial artist, and I was an aspiring bodybuilder.

And so fitness, body composition, sports performance, that was my wheelhouse. That's what I did my undergraduate degree in. I went on to be a personal trainer, corrective exercise specialist, performance enhancement specialist, expert in nutrition, all these kinds of things.

And then in my mid-twenties, something odd happened, which was that I got mononucleosis and I was left with chronic fatigue for close to a year after that.

And that was the catalyst for me really shifting my focus away from the realm of fitness and athletic performance and body composition towards energy.

And so I already had well over a decade of knowledge of health science. You know, I was reading college level

exercise physiology and nutrition textbooks by the time I was 14.

So, you know, I had already had a large amount of knowledge of that, that landscape. So initially what I did was I kind of gravitated towards the the people who were talking about energy.

And I said, well, I don't really know about energy. So who who are the people who who do know about this subject? So I sought out conventional medical doctors initially for my chronic fatigue that I was suffering.

They have basically nothing to offer. Not trying to be mean. It's just kind of the facts. If you look up the sort of official information within conventional medical circles and evidence based circles on chronic fatigue or chronic fatigue syndrome, basically, they say etiology is unknown.

They don't know really what causes it. The best evidence based treatments that they have for it are anti-depressant pills, stimulant pills, cognitive behavioral therapy, and a recommendation to do some walking each day.

And that's literally the the official recommendations based on a paper that is a collection of the research that exists that is presented as guidelines, quote unquote, evidence based guidelines for physicians and how to treat fatigue.

It's called fatigue and overview, if you want to look up, that paper was published in the American Journal of Family Physicians. And those are literally the four treatments that they recommend.

They recommend standard testing. But they go on to say that in 95% of cases, there is nothing found on that testing that explains the person's fatigue.

So I sort out them. They have nothing to offer. I sought out the sort of natural health types, functional medicine types. Everybody was talking about adrenal fatigue and the idea there was chronic stress of various kinds, taxes, the adrenal glands, which produce a hormone called cortisol, which is involved in the stress response and regulating blood sugar levels and things of that nature.

And basically this this theory is that with chronic stress, it's sort of taxes and exhausts and wears out the adrenal glands such that they can't produce enough cortisol.

And that leads to all these common symptoms of fatigue and a number of other problems. I have a whole long story about this, because I spent about a year of my life to this topic, but the very short version of it is I initially went into the research.

I initially found out that conventional medicine was brushed off the whole idea of adrenal fatigue as nonsense and pseudoscience, and that really irked me because a lot of my mentors, people I looked up to, were talking about adrenal fatigue.

I believed in them, I believed I had adrenal fatigue, and what I had the idea to do was to dig into the scientific literature, to prove to write a book, essentially proving to the conventional medical community that adrenal fatigue was real, was supported by scientific evidence.

And what I found. I spent a year of my life finding every single study that relevant to this topic in existence. What I ultimately found is that the science doesn't support the existence of adrenal fatigue.

We could talk specifics on that if you want, but the gist of it is that adrenal fatigue is not the explanation for chronic low energy levels. What all of this study ultimately led to was the core of it centered around mitochondria and mitochondria are our cellular energy generators.

These are the what are we all learned in high school or college? Biology courses and physiology courses. The powerhouse of the cell. Right. That's if you want to get the answer right on the multiple choice exam, you got to remember powerhouse of the cell.

That's the organelle responsible for producing ATP adenosine triphosphate which is cellular energy. So virtually all of the trillions of cells in our body run predominantly, almost entirely on energy produced by mitochondria.

Now, the way that we are taught about mitochondria in biology and physiology, even graduate level and postgraduate level physiology courses and biochemistry courses is essentially that mitochondria are sort of like these mindless energy generators that just take in carbs and fats and pump out energy.

Well, wouldn't it be great if, you know, the problem of chronic fatigue was solvable just by telling people to eat more carbs and fats just provide more fuel to your mitochondria.

But of course, that doesn't work. And in fact, for most people, it will just make you more fatigued if you try to do that. So there's something more complex going on to the story.

And the there's a lot more complex going on to this story, actually, but the bulk of it can be centered around the work of Doctor Robert Naviaux and the cell danger response.

And basically what his work explains is that and this is a scientist. He's an MD, PhD who runs a lab for mitochondrial medicine at the University of California, San Diego.

This was a seminal paper that he wrote that synthesized a huge amount of research from researchers all over the world on mitochondria. And basically what they found is that mitochondria aren't just mindless energy generators, they are environmental sensors in our body.

And they're basically they're not only producing the energy that supplies virtually all of the trillions of cells in our body, but they are deciding how much energy to produce and the way that they decide that.

And actually, maybe just briefly, I'll explain. There's a difference between a component that is involved in a process, energy production versus something that is regulating how much energy is produced or when it's produced, the degree to which it's produced.

So as an example, if you think of a car, there are lots of components of that car that are necessary for that car to function. The wheels, the tires, spark plugs, pistons, crankshaft, engine block.

Right. If you remove any one of those parts, the car won't work. So they're all important. But those things I just mentioned aren't what regulate whether or not that car is driving down the road.

Mitochondria as Energy Sensors and Defenders

That's the human being in the car deciding whether to start the engine or not, whether to press the accelerator pedal or whether the brake pedal and how hard.

Okay, so what's doing that in our body is mitochondria. And they are doing it largely as a function of testing the safety of their environment. Okay. They're probing the environment and asking the question, is it safe for us to produce energy?

Okay. And and in Doctor Robert Navajos words, mitochondria essentially have two fundamental roles. One is as energy generators and the other one is in cellular defense.

So they are testing the environment to detect the presence of threats, stresses, dangers, and to the extent that they are picking up on threats and danger signals that exceed their capacity to handle it.

They are shifting from energy production mode into wartime defense mode. These two roles are mutually exclusive, so to the extent they're doing one, they're turning down the dial on the other.

To the extent that your cells have to defend against threats, they turn down the dial on energy production. So that's

the first big layer, the first of two big layers to understand when it comes to what's really controlling our energy levels.

Yeah, that's really good to know. And so mitochondria like you were saying, you know, we always learn that they produce all the energy, but they're also in a sense they have a sensory function.

And so they're sensing the environment and responding to it. And they're either going to be in a defense mode, in which case they could turn up inflammation and oxidation.

And we could feel fatigued and feel lousy. Like if we get the flu, for example, we can go from one day feeling great, working out, having tons of energy, and all of a sudden wake up in the middle of the night and feel absolutely lousy, have no energy the next day.

And that's really the response of the mitochondria just shunting down energy and going into defense. That's what you're saying there. That's right. Yeah.

There is. There's one other really important component to this story, though. If we think of mitochondria as a cellular engine, like an engine of a car, the other big component of this story, and that is massively neglected even today, as in vogue as mitochondria have become in natural health and functional medicine circles.

You know, when I when I first started talking about this issue ten years ago, nobody was talking about mitochondria. Now everybody's talking about mitochondria.

Mitochondrial dysfunction is the sort of catch phrase in in functional medicine, but it is often framed as sort of like we have these mitochondria in our cells.

They're these static sort of entities that are just there. And mitochondrial dysfunction means they're damaged or they're otherwise deficient and cofactors for energy production.

And the response the the mitochondrial dysfunction protocol, if you will, to correct this problem of mitochondrial dysfunction is to take B vitamins and magnesium and CoQ10 and alpha acid and PK and things like that, and acetyl L carnitine and so on.

And of course, it is possible for mitochondria to have a deficiency in nutrients that are necessary for them to function. And that can absolutely be helpful in certain circumstances.

But for the most part, this is how mitochondria are being conceptualized by most people. And it's missing a huge part of the story. So here's the part of the story they're missing.

If we think of mitochondria, these thousand, 2000, 5000, sometimes 10,000 mitochondria per cell, if we think of it as our cellular engine, we have to also understand that that cellular engine is not a static entity.

It is highly dynamic and highly malleable. And we need to ask the question whether we have do we have a Ferrari V8 engine in our cells, or do we have a lawnmower engine in our cells?

The reason this is important is because if you just give a lawnmower engine in your cells, more B vitamins or magnesium or CoQ10 or carnitine, etc., you've still got a lawnmower engine in your cells and it won't function like a Ferrari V8 engine.

Now what does this have to do with anything? So like, is this real? Am I just making up concepts? Well, let me put some numbers to this. We know that every decade of life, once we reach adulthood, most people's mitochondrial capacity declines by about 10% per decade.

Might not seem like that much. Let me put it another way. The average 70 year old has lost 75% of their mitochondrial capacity. It's a decline of 50% of the amount.

The number of mitochondria per cell each individual might have. Mitochondria has generally shrunk to about half the size, and is only capable of producing half the amount of energy as a youthful mitochondria would produce.

Okay, so if you do the math on that, it's a loss of 75% of your mitochondrial function. That's what I'm talking about when I say going from a Ferrari V8 engine, when you're 20 to a lawnmower engine in your cells when you're 70.

Now here's the you know, some people might be listening to that thinking, well, gee, that that really sucks. That aging does that to ourselves, to our mitochondria, that our engine, our supply of cellular engine decreases that massively.

The good news is this we know that this is actually not a natural, normal product of the aging process itself. This is a product of modern lifestyles.

And the reason we know that it's very simple. If we look at a 70 year old who is a lifelong athlete, an exerciser, they don't lose 75% of their mitochondrial capacity.

They have the same mitochondrial capacity as young adults do. So what this actually is, is a deficiency of or medic stress, a deficiency of challenge to the mitochondrial system.

Okay, so as an analogy, people understand this concept much better at the macro level than we do at the micro level. Now when things are big and visible and we can see them, we tend to understand them much better than when things are happening on a small scale over longer periods of time.

At a micro level in the body, we've all been sort of indoctrinated into a medical paradigm that has convinced us that when you know things that happen inside of this body, this sort of mysterious black box of a body of ours are all new to these micro level chemicals, biochemicals and pathways and enzymes and telomeres and this gene, that gene snip and and senescent cells and NAD+ and neurotransmitters and hormone, you know, all this complex mix of all these micro level nickels.

Okay. So here's the big picture concept. If I go and I lift heavy objects frequently, muscles will adapt to that signal by growing bigger. And I will physically grow larger as a result of that.

On the other hand, if I break a bone and I immobilized my arm or my leg in a cast for two months, when I go to the doctor and they saw off that past two months from now, look down at my leg and noticed that half the size of the other one half is that it was before.

Okay. That's because that muscle tissue atrophied from disuse, from lack of challenge. That same principle is at play in lots and lots and lots of different systems of our body.

Why Mitochondria Decline With Age

The systems of our body are designed to require regular challenges, and if they don't, they shrivel, they shrink away and they atrophy. And in some cases they literally die off.

And this goes all the way down to the cellular level in the sub cellular level to our mitochondria. If we don't challenge our mitochondria regularly may atrophy just like muscle atrophies from disuse.

Okay. And if you think about this, imagine what I just said with muscles. That's just with two months of lack of using your muscles. Now imagine what happens with two years, five years, ten years, 50 years of not challenging your mitochondria, massive amounts of atrophy.

And that of course hugely influences our our energy levels. Yeah, that's a really good explanation. So we need to be stressing those mitochondria because ultimately they get stronger and more resilient to that stress when we do it.

But we have to do it appropriately because if we overwhelm our system, then we're not going to be able to respond and adapt effectively. And so as people are aging, what you're saying is one of the main reasons why people are noticing a lot of these types of symptoms where they have cognitive decline, low energy fatigue, you know, they just don't have that same get up and go.

That has to do with the fact that their mitochondria are shrinking, their their energy capacity is reducing, and ultimately they haven't been stressed enough and adapted enough to stress.

And so therefore their noticing all of these different types of symptoms. And so what are some of the let's talk about like some of the main, the best ways to stress them appropriately and adapt effectively so we can optimize mitochondrial health.

Yeah. So one of the big misconceptions around metric stress is, you know, it's often talked about as a sort of a little bit of poison is good for you.

And this is largely not correct in many, many cases. A better way of describing it is that biologically appropriate and compatible stressors, specific types of stress that are not novel for the human species, but our ancestral stressors are extraordinarily beneficial for our body.

And not only are they not stressful to our body in the sense that we all have this negative connotation with this word stress, they are helpful for the body.

Not only are they beneficial, they are actually required nutrients. In the same way that we require nutrients in our diet, they are required nutrients for our body to function normally.

If I can extend this analogy a little bit further, imagine we have to understand that our body is an intelligent adaptive system. It is not like most systems, most machines in the sense that if we took a simple clock, or a computer, or a bicycle or a car or a chair or anything like that, basically the more stress we subjected to, the faster that thing will break down.

If I take my bicycle or my car and I drive it down a bumpy dirt road, the more I do that, the more it gets mud and water and sun and has to absorb bumps.

The faster it's going to break down. The more stress is exposed to, the more that it breaks. Okay, it's a very linear equation. More stress means more breakdown.

Most people think of the human body in this way, but it doesn't actually work like this. The proper way of thinking about it is imagine that you had a sports car that's a magical sports car.

It has a it has a supernatural power where when you take this sports car out and you drive it hard and fast on windy mountain roads, push it to its limits, crank that engine as fast as it can go, and then you go park your car in the garage overnight.

You come back to your car the next day and it grew a bigger, stronger engine and became more fuel efficient. And the tires developed more friction to grip the road better.

And the car became more aerodynamic. And it it and the frame became stronger and the suspension learned to absorb the bumps better. Okay. And everything about that car became better and stronger as a result of being challenged and stressed.

Okay, that is how the human body works. Stress these when it's biologically compatible. Stress makes us stronger. Okay. And but the downside of of this magical ability that this sports car has is that if you leave it in the garage for two months and you don't challenge it, you come back to it a couple months later and the wheels are falling off and the frame is rusting, and that Ferrari V8 engine shrank to a lawnmower engine and so on.

Okay, that's how the human body works. It's an intelligent adaptive machine, not a simple machine. And because of that, because of that magical ability that's programed into us, it comes with that trade off, okay.

It has the ability to be resilient to to not only survive stresses, but to actually be made stronger and healthier by them. But the the downside is if you don't regularly challenge the system, the system grows weaker.

Okay. So that's the context of of how the human body needs needs to be understood. From there, we need to understand that there are many different ways that the human body can be challenged and grow stronger.

So you asked me a minute ago, remind me of your question, David, asking about like the best strategies. What do we need to do to strengthen the. Okay, so the first thing that we need to understand what you were talking about a minute ago with the dose is that the dose is going to be individual to the to the person.

Okay. So if you have a lawnmower engine in your cells, you're going to have way less capacity to tolerate stress than somebody who has a Ferrari V8 engine in their cells.

So first of all, to get the dose right, it needs to be individualized to a person's level, to a person's capacity. And the way we do that is very simple.

Test your capacities in different ways, whether it's fasting, whether it's sauna, whether it's different types of exercise, whether it's breath holding practices.

Test your your capacities slowly and cautiously defined where your limits are okay. And you find that you brush up against discomfort. Stop there. The first few times okay.

You don't need to have some objective, you know, amount. Oh, I'm supposed to be doing this amount of exercise. You know, this type of exercise for this many minutes per session.

And I'm going to go from zero minutes of exercise right now to 45 minutes of this type of exercise starting tomorrow. No, start with five minutes. Start with ten minutes.

Start with however many minutes you can do before you feel a lot of discomfort.

Stress, Adaptation, and Mitochondrial Resilience

Let that be day one and you build on that. Next time, do slightly more, next time, do slightly more, and so on. So that's the issue of dose. The other issue is biological compatibility.

We need to understand that not all stress is created equal. That cigarette smoking, the chemical stress from that or from environmental toxicants or from sleep deprivation or from chronic psychological stress or any other type of novel stress in the modern human environment is not the same as our ancestral stresses.

So our ancestral stresses, we had certain things built into our life where we had to we were exposed to periods without access to food. For example, we had to deal with famine and food shortage.

We had to deal with lots of movement and exercise intensity, whether it's to hunt or to build or to fight or to run away from stuff. We had to deal with heat and cold.

We had to occasionally deal with hypoxia at tissue level, whether from activity or breath holding or other conditions, maybe being in a cave or things like that.

Some groups of humans had underwater hunting strategies where that was more prominent. We had to deal with exposure to phytochemicals in the foods that we were consuming and a number of other stressors.

And those are the stressors that are specifically built in to our biology, that we are designed over thousands and

thousands of generations of human beings.

We evolved the capacity to handle, not only handle those structures, but actually we evolved the biological capacity to adapt to them and grow stronger, be made stronger and healthier and more energetic and more disease resistant.

This is why, you know, for 75 years we have had modern medicine pursuing studying disease, studying the business of disease. And then based on this, trying to go to a chemistry lab and invent chemicals that are targeted to those mechanisms of disease, with the idea that we're going to have targeted chemicals that interrupt this mechanism of atherosclerosis or this mechanism of, you know, the serotonin levels, certain levels in the brain of depressed people, or we're going to alter the formation of amyloid plaques and disease.

For 75 years, modern medicine has been doing that. We've bested trillions of dollars into that, and we've invested millions of potential candidates, 19,000 of which have been approved and are in use.

And out of those millions of drug candidates, trillions of dollars of money spent, hundreds of thousands of scientists pursuing this kind of model of human health.

We don't have a single one that is anywhere close to as powerful in promoting health or preventing disease as simply moving your body vigorously for half an hour, or getting into a sauna for half an hour.

Okay. And that if I can conceptualize it in a nutshell, that is the power of these kinds of strategies that I'm talking about. That is how essential they are to human biology and human longevity.

Yeah. So again, such a great, great, great approach to this and really looking at what did our ancestors do and how did they approach their life on a regular basis?

What kind of stresses were they under? Now let's go into nutrition principles. How do we eat for healthy mitochondrial function? Yeah. Well there's a number of components to this.

Could be a long discussion I know we had a discussion like this. Previously on your podcast. Let's look at nutrition through the lens through the lens of these kinds of challenges to the system that I'm describing okay.

Put stress on that energy production system. Because what happens if you have an engine that is being deprived of fuel sources, okay. Because you don't have as much fuel coming into that system from, in this case, food.

There's different ways that this challenge could happen. It could be a shortage of a particular macronutrient, like carbs or like fat, or it could be a shortage of total fuel, carbs and fats in particular, which more much more than protein, are used by mitochondria to produce energy.

It could be, you know, a food shortage where you have low amounts of food, or it could be a full blown famine, you know, for for a prolonged period of time where you've got almost no food for days and days and days.

These represent challenges to the bioenergetics system, to the cellular energy machinery. And fortunately, because we evolved with those challenges, our system developed redundancy, where it has multiple different types of multiple different ways and layers of ways to get fuel and to be able to pump out energy.

Okay. And one of those ways is if, you know, is using the fuel that's coming in, if you've got carbs coming in. Okay, we can burn carbs. If you've got fat coming in, we can burn fat if you don't have carbs or fat coming in.

Okay, let's tap into our glycogen reserves, our stores of carbohydrates, in our liver and in our muscles. Okay, that only lasted a day or two. Now, we ran out of that. What do we do now?

Let's tap into our body fat stores and our adipose tissue on our body. And let's pull fatty acids from there and burn those as fuel. Let's also, if we've really got a shortage, we need to start using hormones to break down our own

muscle tissue on our body into amino acids, which we can convert into glucose, which we can burn that glucose carbohydrate for fuel.

Right. So we start pulling from our own bodies tissues. And much better to pull from your fat reserves than pull from your muscle tissue. But but that's the system now on the at the energetic level, we've got the ability to produce energy in the mitochondria itself, the beta oxidation.

We can produce energy in the mitochondria from fat. We can produce it from carbs. We can produce it from ketones. We can burn energy outside the mitochondria too.

We have layers and layers and layers of this system. But fundamentally, when we challenge the system in these ways, whether it's a low carb ketogenic diet, whether it's a low calorie diet, whether it's whether it's multiple days of fasting, we are we are presenting a challenge to that bioenergetics machinery.

And a couple things happen in response to it. A few things happened. One, we ramp up autophagy. And Mike, and this helps clean out the junk in ourselves because in the strained state, in the in the state of being challenged and under that increased demand, any dysfunction that's present there starts to become more noticed.

The body becomes more sensitive to it.

Nutrition, Fasting, and Mitochondrial Biogenesis

It starts to throw off more free radicals cause more inflammation. The more challenge and strain that system is under more problems you get from dysfunctional machinery.

So one of the things that it does in response to being challenged is it cleans out the damage and dysfunctional machinery through autophagy and through mito, which is autophagy at the mitochondrial level, cleaning up the damaged and dysfunctional mitochondria to to have a healthier supply of mitochondria.

In addition to that, we also from this challenge get the stimulation of what's called the Nrf2 pathway, which is basically a pathway that that is stimulated when there is an increase of oxidants in the system.

And this this also happens with exercise as well. We get a big burst of oxidants. And those oxidants typically historically have been thought of as bad guys.

But turns out they're actually vital signaling molecules that perform very important and beneficial roles. One of which is to well, they do a couple of things.

They signal for mitochondria to produce their own supply of internal antioxidants. So things like glutathione and superoxide dismutase and catalase, that internal antioxidant supply a system called the R E, the antioxidant response element, which is really much, much more important than any external antioxidants we get in our diet or via supplements.

It's building up and having a robust internal antioxidant system that it stimulates the robustness of that system. It also stimulates, simultaneously mitochondrial biogenesis, the creation of more of bigger, stronger mitochondria and more new mitochondria from scratch.

So I previously talked about 70 year olds losing 75% of their mitochondrial capacity. Well that is opposed. We can we can combat that and reverse that through the process of mitochondrial biogenesis, of growing bigger, stronger mitochondria and more of them.

And fasting or food shortage or nutrient cycling is is one way to create that, that strain, that challenge on the system that communicates a signal to your mitochondria, hey, in order to better survive this environment, because that's what the body really cares about.

It cares about surviving the environment. In order to better survive this environment, we need stronger energy production machinery at the cellular level.

And just like if you lift heavy weights, your body goes. In order to survive this environment, we need stronger muscles. When you create those kind of inputs on the bioenergetics system inside your cells, on your cellular engine body does the exact same thing.

Says to survive this environment, we've got to grow a bigger, stronger cellular engine to keep up with these energetic demands on the system so we can better survive these periods of food shortage or famine.

Yeah, again, really great explanation there. And ultimately, you know, I always say the quality of our life comes down to the amount of and the overall functionality of the amount of stress resilient mitochondria that we have in our system and our ability to turn on and off that parking brake, that cell danger response.

It's so important that we turn that on in certain circumstances, but we need to be able to turn it off once the danger, once we've gotten the danger under control.

And I think that's so key right there as well. And so yeah, so really good stuff with when it comes to fasting like you were talking about there. Now how about food and nutrients.

You mentioned our ancestors being exposed to different things like phytonutrients and that actually being a horse medic stressor on the cells and on the mitochondria.

So let's talk about some of the key nutrition principles and foods that people should be looking to get in their diet. Yeah, there's a popular dietary ideology that has come into vogue in recent years that's like the carnivore diet.

And many of these gurus of this diet have promoted the idea that plants have phytochemicals. And what phytochemicals are are these they're they're plant poisons, essentially that that evolved in order to ward off insects or animals consuming them because they they have a slight they have they have a toxic effect.

So the evolution of these compounds was like, don't eat me because I'll make you sick if you eat a lot of me. Right? And that makes sense, you know? Yes. So so they have the so basically the idea is plants have these toxic defense chemicals.

And therefore you don't want to eat toxic, you know, poisonous compounds do you. That that were designed that that evolved for, you know, to dissuade animals from eating them.

And there's a certain logic to that. Right. And that sort of makes sense. The only problem with it is that this has actually been known for decades, and there's a whole field of research called Xeno or Mrs.

Xeno with an X, x, N, O, or Mrs.. If you want to look it up on PubMed or Google Scholar, you'll find hundreds, if not thousands of studies on this topic.

And it turns out because we co-evolved with those plants that also produce those phytochemicals, we evolved our own capacities in response to that, we evolved the capacity to not only detoxify and not be damaged by those compounds, but to benefit from them, to be made stronger by them.

Okay, let me present an analogy for you. If if the idea of, you know, don't eat stuff that's toxic for you, that's stressful on your body makes sense to you.

Well, consider this what if I said, did you know that that moving your body really vigorously and intensity and putting a lot of strain on your muscles creates a big surge of stress hormones like adrenaline nor cortisol creates a huge spike of oxidants of of, you know, and everybody knows oxidants or free radicals or bad guys. Right?

So they're toxic to ourselves, right? You could find lots of literature on oxidative stress and oxidative damage

driving all kinds of health problems.

So what if I logically extended that to say, well, obviously exercise is really harmful to you because it creates such stress on the body with these stress hormones and with these stressful, damaging oxidants?

Well, the only problem with that is that we know that exercise is tremendously beneficial to our body.

Phytochemicals and the Benefits of Plant Foods

And what what's going on there is that our bodies, as I explained earlier, evolve the ability to not only handle those sources of stresses, but to be made stronger by them, to use them as signaling molecules, to actually build an engineer into the different systems of our body at multiple different levels, from the mitochondrial level to the muscular level, to tendons, to bones, to the cardiovascular systems, to the lungs, to the brain, even to the nervous system, many, many different layers of the system actually grow stronger and increase their stress buffering capacity, their working capacity.

In response to that brief stressful encounter with vigorous, intense, demanding movement. The same principle is at play when it comes to consuming phytochemicals.

In the vast majority of cases, these phytochemicals are easily neutralized by our body. They don't cause harm unless you consume ridiculously abnormal amounts of concentrated, specific chemicals.

They are easily neutralized by our body. And not only are they neutralized, they are signals, much like exercises to make the system stronger. So I mentioned the NRF two pathway earlier with regards to fasting.

While phytochemicals also stimulate the NRF two pathways. So does exercise by the way the the these phytochemicals and whether it's sulforaphane or curcumin or a long list of hundreds of other compounds, specific phytochemicals found in different plant foods and mushrooms and things like that.

These phytochemicals stimulate the NRF two pathway, which creates a low level oxidative stress on the system that's not damaging and stimulates the growth or the the increase in antioxidant supply of that AR, that antioxidant response element, and works to also simultaneously stimulate a mitochondrial biogenesis, the growth and the strengthening of mitochondria, and the creation of new mitochondria from scratch.

So anyway, all of this is to say, don't don't be fooled by the idea that phytochemicals and plant defense chemicals are are harmful for you, and you have to avoid them.

Of course, there are also poisons actually truly harmful poisonous compounds and plans just like there are. You can find those in the animal world too.

There are things in the animal world that are truly toxic for you, and that you should not eat and will kill you. So, but the vast majority of these phytochemicals and plant foods are enormously beneficial for us.

And it's not just theory or the field of xeno Hermes that we know that from. Of course, there is a body of tens of thousands, if not hundreds of thousands of of studies on specific phytochemicals and their health effects on different systems.

The the body. Yeah, that's really good. I always say, you know, the best diet is really a varied diet where you're consuming a lot of different types, different colors, different types of things.

When you're eating, you know, the same, like a lot of people are eating the same ten foods all the time. And it's easy to get into that trap, and then you're doing less of that sort of stress on the system.

The body starts to adapt to those specific things that you're getting, and you're not getting the full benefit as opposed to when you're getting a very, a, a very diet, obviously, all things from nature.

But I think that that's going to work, work best. And I, you know, with, with some of your metaphors, I always like the slinky effect too. It's kind of like slinky in order to get it to propel to the next step.

In order to to build this internal resilience, it needs stress. It needs to be primed. So a lot of these things that we're getting from plants, whether or exercise, wherever it is, it's stressing our system, it's priming, pushing down on that slinky.

When you release now the slinky jumps up to the next step. It actually increased its potential, right? Increased its overall and endogenous antioxidant defense system.

You know, when it when it comes to a human, you know, its overall adaptive potential because it had that stress and that priming effect. That's right, that's right.

And if you don't keep pushing and pulling on that slinky in the way, in that way the slinky starts to rust and become dysfunctional. Yeah. Really good.

Yeah. Let's talk about circadian rhythm and how important that is. I think that particularly for a lot of younger people, like I know for myself, you know, just dealing with a lot of health issues, when I really look back in my early 20s, I had my circadian rhythm was way off track, and I think that was at the root of and for me, I had irritable bowel.

So there were a lot of things I responded poorly to higher Fodmap foods, eating foods that naturally would be healthy. I had to eliminate those for a period of time in order to get my gut health back to so I can have the very diet.

But when I really look at it, it wasn't those foods that made me sick. You know, obviously processed foods or toxins, things like that in the food. But if I were to point my finger at one thing that I could have done better in my late teens, early 20s that I think was at the root of the irritable bowel, it was circadian rhythm dysfunction.

So let's talk about why that's so critical.

Circadian Rhythm and Regeneration

Yeah, maybe if I zoom out and present a bit of context and kind of tie this into the concepts that we were talking about previously, humans need two things just to be healthy.

One is that we need, as I explained before, we need we require the essential nutrient of challenge on the system of systems of our body for those systems to either grow stronger or just to maintain their level of youthful structure and function.

So one of the main deficiencies that modern humans have is we have a massive deficiency in those types of physiological stressors that used to be part of the ancestral human life lifestyle that used to be just we didn't have to think about them or do them consciously.

They were embedded into our lives. Modern humans are massively deficient in that. So are the systems of our body are atrophying, degenerating in in large part due due to that deficiency.

But the other thing is we also need really powerful regeneration and repair time, and we need this oscillation of stress and challenge on the systems.

And then deep restorative repair time, where those systems can and adequately and truly repair and not only just repair to go back to baseline, but the idea with challenge is that you grow stronger and better and healthier.

You literally improve the physical structure and function of the systems of your body, down to the mitochondrial level that are growing bigger and stronger to be able to produce more energy.

And in order to do that well, you have to have good, what I call regeneration rituals in place and the several components to that. And actually, one other thing I want to mention is most modern humans are deficient in both.

So we're instead of having this oscillation of challenge demand on the systems, you know, intense demand on the systems, enough to stimulate and growth and really strong regeneration rituals.

We are flatlining it. We're not doing that oscillation. We're sort of constantly in this middle ground where we're doing neither of those two things very well.

Now, when it comes to the regeneration rituals, we need a few things we need. We need really good nutrition to provide the raw nutrients, to repair the physical structure of our body.

And we need relaxation to be relatively free of chronic psychological and emotional stress. So we need a calm environment. And this is where, you know, healthy relationships and things like meditation and yoga come into play and time with family and time with people that you love.

And we need to also have really strong circadian rhythm and sleep habits. So that circadian rhythm piece of it is this is what links the sleep and wake cycles.

So we have a biological clock built into our brain and two part of the brain called the super nucleus. And it is a literal biological clock like a 24 hour clock, hopefully a 24 hour clock.

It's supposed to be and it's synced up primarily. It synced up to the day and night cycles, primarily through light signals and specific wavelengths of light, largely the blue spectrum of light.

Like when you look at a blue sky that's blue light entering your eyes. That blue light feeds back through your eyes, into receptors, into nerves that go into this biological clock in your brain and basically say it's daytime, the time to be awake, alert, active and energetic.

And then when and we don't have that blue light entering into it, that is also interpreted as a signal, okay, it's nighttime. It's the time to wind down, relax and go into sleep mode so we can regenerate the systems and recharge the systems.

After this day of stress and demand on the systems, that system links up with almost every part of our physiology down to the sub cellular level. And we also have peripheral.

This is a newer scientific discovery. In more recent years. We have peripheral biological clocks in almost every tissue from our skin to our internal organs, our intestines, our liver, you know, our heart and our our mitochondria also have essentially a clock functions built into them.

They're designed to link up to the circadian clock. And what we want ultimately is we want to synchronize as much as possible, the central clock in the brain with the peripheral clocks in the other tissues of our body.

The central clock is primarily sensitive to light. The peripheral clocks are sensitive largely to food inputs, but also the clocks are sensitive to to movement and to temperature and other forces like stress and stress, hormones and things like that.

So there are a number of forces on it. But the central, the dominant force is light. And the way that these link up with all of our physiology is through lots and lots of different chemicals, through neurotransmitters that are tied to the circadian rhythm, through different specific what are called clock genes, through hormones that are tied to the circadian rhythm.

So some of the hormones that operate on diurnal curves or tied into the circadian rhythm are things like melatonin and cortisol, things like testosterone, thyroid hormone.

And there are there are others as well. And these, these, these hormones and neurochemicals and clock genes basically touch, you know, like like if you think of tentacles of an octopus, for example, they touch every system of our body.

So what's going on with this light signal from the environment feeding back into the brain is sending signals that affect, in one way or another, either very directly or indirectly, pretty much everything in our body.

And because this is regulating, you know, the the sleep wake cycles, whether you should be awake, active and energetic or whether you should be in rest and regeneration mode and sleep mode, this is a really critical mechanism for human health.

And one of the things that we need to really get right when it comes to this is we need to prioritize light exposure, getting bright light, ideally outdoor sunlight in our eyes, ideally within the first half an hour after waking up and at least a couple minutes of of bright light if if it's a sunny day.

If not, you might need more like five, ten, 15 minutes of outdoor light to get that circadian rhythm going. And we need to reset that every day. We also need to, as much as possible, get bright outdoor light throughout the day and create a big differential between the intensity of the light that we're getting during the daytime and the intensity and wavelengths spectrum of light that we're getting at nighttime.

So we want in in the hours preceding bed. We want the intensity of the light to be ramped down, and we want the spectrum of the light to be shifted red.

We want to get away from the intense blues and to be shifting more into the amber and red wavelengths of light, and those are the also part of the biological signals for increasing melatonin and suppressing and and basically promoting sleep and regeneration at the cellular level.

Yeah. That's key. There's a proverb that says if you want to have great energy during the day, watch the sunrise. And if you want to sleep great at night, watch the sunset and you can add in there.

Get some time in the middle of the day where you get that full UV spectrum, at least some of that into your, you know, not not looking straight at it, but you know, into into your cells, right into, into all the cells of your body.

And then at night block as much of the light as possible. You want minimal light exposure. And like you mentioned for me, think about our ancestors. They didn't have.

So they don't have they didn't have lights. So if they were exposed to anything, it was fire candles. Right. So it was kind of that red spectrum. What do you do?

It turns out that, you know, the the promotion of melatonin. So everything you said is spot on. I'll add a few things to what you said since you brought those those those things up.

One is we need to understand melatonin. You know, most people think of it as like a sleep hormone or just a supplement. A lot of people don't even realize it's a hormone.

It's a critically important hormone. And not only does it promote sleep, it's directly tied into the mitochondria. It's a critically important mitochondrial antioxidant that essentially not only protects your mitochondria, but also recharges it, interacts with that internal antioxidant defense system, and is designed to recharge that system each night while you sleep, so that it's ready for the next day's exposures to busses.

And imagine as a as a point of reference, there's research showing that just simple exposure to indoor home lighting, you know, standard, you know, ceiling lighting of LEDs and fluorescent suppresses melatonin levels by about 70.

Melatonin, again critically important mitochondrial and antioxidant. Also neuroprotective. Also cancer protective.

What happens if you if you are chronically massively suppressing a critically important neuroprotective, cancer protective mitochondrial protective hormone that is designed to recharge this part of your your cellular engine each night while you sleep and you're doing that night after night after night for years or for decades, you can't reach your meal effectively.

Yeah. I mean, do you think it might lead to having chronically low energy levels, having poorer brain function, having increased risk of cancer? Absolutely. Yeah.

And that's one of the major contributors that we're seeing in our society. So last question. Are you what are you doing on a daily basis. Like how do you set up your circadian rhythm.

What's your ritual like? Yeah. Well first thing when I wake up is I take my dogs here outside, get them on the land of my property, or take them for a walk just to get light in my eyes, to get allowed them to do their, their business.

So I kind of killed two birds with one stone.

Daily Light, Sleep, and Recovery Rituals

I take care of me and I take care of them at the same time. Usually after that, one of them in in you're getting outside and you're getting movement in, which is key.

That's, that's also a teaches your body wakefulness. Right. The right. That's right. Sol release to have wakefulness in the morning. Exactly. So after that is really when the movement starts beyond just the walking is I'll either surf or I'll go play tennis.

Most days, if I don't do that, what I'll do is I'll do a gentle mobility sort of routine workout, take care of my soft tissues, do some breathing practices, do some, basically opening up the joints and muscles of my body and taking care of my joints at the same time, making sure that my tissue quality of my muscles and my joints is healthy.

But, you know, a lot of people, I said earlier how we've all been indoctrinated into this paradigm to believe that our health is largely a product of like, what shows up on our blood tests or a microbiome test, you know, or organic acids tests and things like that.

But we need to understand at the macro level, you know, we are a collection of organ systems. We are a collection of muscles and bones and a cardiovascular system and a brain and a nervous system and tendons and joints and ligaments.

And we need to understand that the health of those macro level organs is not purely a product of what shows up on your blood tests. In fact, it's largely a product of things that don't show up on your blood test.

And what I mean by that is, you know, how much movement you get, or your circadian rhythm habits, or how much sauna exposure or how fit you are. Those things don't show up well on your blood tests, okay?

Whether you got light in your eyes that day. But you know, specifically what I wanted to say is taking care of this physical, physical meat suit of ours with our physical muscles and bones and joints is a critically important piece of longevity.

And we have to take care of those, the health of those systems on a daily basis, because we need to realize that people don't die just from, you know, diseases that are being driven by things at the micro level, senescent cells and inflammation and this torment and that hormone and this chemical and this gene mutation and that gene mutation, they're driven by simple things like falling down.

Right. Like losing your balance and falling down, like physically tripping over something and not having the capacity to stop your fall. Oh, now you broke a bone. Now you're in the hospital.

A third of people are dead within a year. Another third never fully recover from, for example, broken hips and end up in in care homes and and only one third actually recover full functionality.

So we need to understand that simple accidents that are the result of dysfunction, deficiencies in the structure and the function of our physical body, which is not really a product of which shows up on your blood test, is a hugely important component to this.

So in my personal life, I spent a lot of time caring for this physical structure and function of my body. I play tennis, I surf, I do a lot of weight training and and a lot of mobility work to keep my body moving like a supple athlete, like a very useful, high performance person.

And that's something that I think is very important. I also challenge my brain cognitively because we have to understand our brain, much like our muscles, also maintains robust structure and function largely as a result of cognitive demand.

We have something called cognitive reserve capacity, which is the same as energetic reserve capacity at the at the mitochondrial level, or muscular reserve capacity at the muscular level.

It's how much workload can that system handle. And we know that people who go on to get higher education, people who have cognitively demanding jobs, have more cognitive reserve capacity built into their brain.

And this is hugely protective against neurodegenerative conditions like Alzheimer's and dementia, for example. So a large part of my work day is also doing cognitively demanding stuff, caring for my physical body, caring for my brain, and the rest of my time is spent with my family and my kids.

Yeah. And then at night, are you turning off all the lights? What are you doing to kind of set yourself up for a great sleep? Yeah. So in my main living area in the bedroom, we have all incandescent and halogen lighting.

So it's all amber and red shifted lighting. That's the lighting we use after the sun goes down. And that does a couple of things. And it's not LED in fluorescent lighting.

This is important for two reasons. The lack of blue light, which is important for not taking melatonin, and the presence of red and near infrared light, which actually promote melatonin secretion so that amber and redshifted environment, not just the color, but actually the presence of of red and near-infrared as specially near-infrared, which you will not have with LEDs or fluorescence even if they are of the right Kelvin color temperature.

Yeah. And you can see near improvements not on the visible spectrum. That's correct. So that is also promoting melatonin onset and melatonin release. And yeah hop into bed with my you know, after dinner we hang out in the living room. We play we dance.

And you know, sometimes play board games or Jenga or something like that or play with a ball where tennis family. So sometimes I'll play tennis with my kids in the living room.

I'm just hitting the ball back and forth or hitting a balloon back and forth, and we go to bed, we read stories and we fall asleep. And we have a, as you mentioned earlier, pristinely dark room at night, which is equally as important as a very bright, large amount of bright light during the day.

Great. Great interview, Ari. I mean, we could talk all day about this kind of stuff. That routine sounds a lot like what my family and I do as well. And and so just really appreciate your expertise here and all the great, great work that you're doing out there.

Guys. You can definitely check out his books where he goes into all of this in a lot more detail and really gives you step by step action steps. His most recent one is eat for energy How to Beat Fatigue and Supercharger mitochondria for all the energy.

Fantastic book. I read that book a wonderful book. He also has the ultimate guide to red light Therapy. So wonderful books are you doing great work? Really appreciate your time.

Always great to connect with you my friend and we see you soon. Yeah. Thanks so much my friend. Talk to you soon. All right. Bye bye.