

Announcer: Bulletproof Radio: a state of high performance.

Dave: You're listening to Bullet Proof Radio with Dave Asprey. Today's cool fact of the day is about this little thing called autophagy. The 2016 Nobel Prize in Physiology and Medicine was awarded to a cell biologist named Yoshinori Ohsumi for his discoveries of mechanisms of autophagy. That was awarded a couple years after the Bulletproof Diet came out where one of the techniques, which I called Bulletproof Protein Fasting, where you avoid almost all protein for 24 hours to turn on this amazing process in the body, when I published the book but the Nobel Prize was based usually on 30 or 40 years of research. So this is stuff we've known about but you probably haven't heard about and the reason that there was a rush of interest in this is because autophagy means self-eating and it's described as the cellular house-cleaning or self-renewal process. There's something in your cells you probably don't know about called autophagosomes and they're built around junk the body wants to destroy. So these things compost the garbage into reusable building blocks and nutrients and what are some things like that? Fat deposits, older, damaged organelles, clumps of poisonous proteins, toxic molecules; basically if something's going to gum up your works you might want to clean it out every now and then. You're going to read a lot more about this in my anti-aging book that's coming up here.

Dave: Right now there are more than a dozen biotech firms developing small-molecule drugs to enhance or inhibit autophagy to treat all kinds of diseases and I would put aging on that list of diseases. Today's guest is a very interesting author, public speaker and coach who has really focused in on autophagy. His name is Siim Land and he's in Estonia. His newest book is about 500 pages, it's called "Metabolic Autophagy". It's one of those books you can't put down if you're into the metabolism and if you're not into the metabolism it might be a bit much but that's all right because we all have metabolism. The question is how much do you want to know? In today's episode you're going to learn quite a bit about what's going on in there that you didn't know about and what you can do about it. Siim, welcome to the show.

Siim: Hey, hey Dave. Thanks for having me.

Dave: Now you've been on a couple of my friend's shows as well. You've been on Dr. Mercola's show, I think that's pretty cool. He's a friend and has been at the conference. He mentioned your name and several other of my colleagues were like "Dave, you've got to talk to Siim." So I've been excited to do this.

Dave: You started your blog about this just in 2015 and you were still in college and you weren't studying autophagy. You were studying something almost the same; anthropology. I mean, they rhyme sort of but...

Siim: Yeah.

Dave: What's going on with that? Why are you an autophagy fanboy?

Siim: Yeah well, I think, like I said, if you're interested in this metabolism and everything related to the body then it kind of creates this intrinsic curiosity about how do, or how does these things work? As well as how do you optimize them and I've been into this bio-hacking thing for yeah, ever since I started college and at that time I was focused on anthropology but it wasn't something that I wanted to do for the rest of my life. It was somewhat, I was just scratching my own itch and wanted to learn more about the human animal or the human being inside a culture and inside a society. So in a way it isn't directly connected with biochemistry or biology or autophagy but it's still something that's going to teach you or makes you more curious about the human animal and how does everything work.

Siim: During that time I was creating articles on my blog and one of the kind of re-emerging topics that I was really fascinated about was intermittent fasting and autophagy so ever since that time I was just scavenging all the different new research that's come out of it and learning how to actually apply it to your everyday life. Now that I've written a book about it, I just wanted to share all that knowledge I've gathered over that time and also refute some of the misconceptions and fallacies about both fasting as well as general diet.

Dave: You don't have a degree in medicine or anything like that, right?

Siim: No. I'm just a Bachelor's in Anthropology.

Dave: So, I've got to ask. What makes you qualified to write a book like this?

Siim: Well yeah that's a common question. First of all, I don't have a real biochemistry degree and second I'm so young. Like who are you talking about longevity and anti-aging but I think that may be another one of those strengths that makes people want to learn or pay more attention to me. Just because, you know, it's somewhat so deviant and so contradicting at the same time.

Dave: Deviant, I love it.

Siim: Yeah. Or so rare.

Dave: It's kind of a dumb question and I've never really asked that before because if someone did something, by virtue of doing it they are now qualified to do it. That's the definition of it. A *Wall Street Journal* reporter asked me that on stage. Like, how dare you do bio-hacking, you don't have a white lab coat and a medical degree! I'm like, well, here's one of the little things. You can't take away my medical license for telling the truth now can you? I've interviewed lots of doctors on this show who've had they're license revoked when they said hey, I've found something new and then they get slapped around for a while and 20 years later someone comes along and says hey, actually this does work but by then they've ruined their career. So there's a role for people with inquisitive minds like you to go out there, dig deep- you have 50 pages of references in your book.

Dave: My very first one, "The Better Baby Book", what right do I have to write that? I don't know. There's 1,100 references in the book and it was actually researched. So doing research, you don't have to have a degree, much less a degree in medicine or biology so just the curiosity and willingness to do awesome things.

Siim: Yeah, that's the beauty of bio-hackers taking control of their own health and actually going deeper into the science than other people.

Dave: You nailed it and you're definitely, I mean you're all over this idea of bio-hacking. I love that you started when you were at the- basically when you started school. So you started school what, in 2011?

Siim: Yeah, something like that. Yeah.

Dave: That was right when the term was- when I first wrote the definition of it. So you were very early. That's cool.

Siim: Yeah.

Dave: And right now your Body Mind Empowerment podcast, you've got 120 episodes. You're interviewing a lot of people to learn. Which is a higher ROI, return on investment, for you: reading a paper on PubMed about something or interviewing someone about something?

Siim: I think it depends on the particular topic. Like, there's definitely a lot to learn from many individuals and this just osmosis effect learning from, near exposure from them. You could talk to people like (Dr.) Mercola or Vishen Lakhiani then you can definitely gain more than just the knowledge from them. You gain more like this, sort of a general vibe and you can learn, you learn the way they think and that kind of changes your own way of thinking. So I think that is much more powerful than just, you know, reading, regular studies, etc. Especially if you don't have, let's say, a lot of background or you don't have a background knowledge about the particular topics. You may just, you know, be reading it for nothing and you may not get that much out of it versus a real conversation is definitely more, it's going to rub off on you a lot more.

Dave: I love that answer; the idea of getting a vibe from someone. I learn more from having a really good conversation with someone smart, someone who's done the research. Usually then by going out and doing the research myself, all though sometimes I'm like ah there was a nugget and I had to read the paper and whatever but you can read an awful lot in a cave somewhere and maybe not move along your path as far as just being able to interview, you know, a hundred people who are doing good stuff. Which is cool, one of the reasons why I continue to do the show. I don't have to continue doing Bulletproof Radio I just like to because, you know, we get to have this conversation.

Dave: All right, let's jump into "Metabolic Autophagy". Why did you choose that title for your book? Metabolic versus the benefits of super autophagy, you know. What was behind

your thought process there because I wouldn't have known how to name a book this complex.

Siim: Yeah well, when you look at, what does metabolic mean then it just refers to the general, kind of, processes and the phenomenon of your metabolism and that's generally everything that is related to energy production, growth, repair, etc. etc. So your whole entire world is almost surrounded by the concept of metabolism and the reason I added autophagy to that is also that when I was doing that research about autophagy then I realized that it's kind of a very central component to everything else that your body goes through on a daily basis. There's some form of autophagy happening almost all the time and it's very connected to, for instance, life extension from caloric restriction. It's connected to brain protection against neural degeneration and general insulin sensitivity, it's protecting against muscle sarcopenia and so on so yeah I found it to be actually so much more important and so much more central to the entire metabolic processes. So it was a good combination I decided to put together.

Dave: I understand controlling our metabolism is really important and it feels like autophagy goes beyond just your metabolism. Your metabolism is the rate at which you're turning food and air into electrons at the end of the day. Some of the stuff that's going on here is more about system self-repair and other longevity and anti-aging things like that which is why I've been fascinated with autophagy for a very long time. So if autophagy goes beyond the metabolism, let's just jump into some of the stuff that works from your book. What is your take on why intermittent fasting has a place?

Siim: Yeah, for well, I think intermittent fasting is almost like a very normal way of eating that humans evolved under. If you think that hunter/gatherers in the past were used to eating three square meals a day then you're quite wrong. They were actually more- they spent more time in a fasting state than in a fed one. So that already tells you that the process of, or doing some form of intermittent fasting or time-restricted eating itself is almost built into the natural ways our metabolism is supposed to work. Also, research is showing that, well at least one of the few known ways of promoting life span across all species is caloric restriction. That applies to yeast, flies, roundworms, etc., but when you actually look deeper into that then you can see that autophagy plays a critical role in the life extension effects of caloric restriction.

Siim: Such as, if you genetically modify some mice that they won't express autophagy in adequate amounts, even when they are put under severe caloric restriction, then those mice, they're not going to live longer. Whereas the mice that have normal autophagy activated during caloric restriction, those mice, they show those life extension benefits. So that applies to different research in yeast as well as mice. So that can tell you that the goal, or the reasons why caloric restriction extends lifespan isn't just because of the caloric restriction. It's because it stimulates certain longevity pathways such as autophagy, such as sirtuins, such as FOX proteins, AMPK and so on. Those things, they can be activated with other means besides just caloric restriction and intermittent fasting has been shown to be as effective if not even more effective in inducing those same benefits and you don't have to starve basically.

Dave: I've been to more than a few conferences at the American Academy of Anti-Aging Medicine and places like that, just from 20 years of anti-aging non-profit work and there's always five or six people who are rail thin and they're saying wow, you know I'm practicing caloric restriction and I eat 1300 calories a day and I really don't feel like I'm hungry all the time and I got used to being cold all the time and they do not look well. They're saying, but I'm going to live longer and I'm just thinking, that's not the kind of life, if you lived one-third less quality and you live one-third longer you sort of, maybe washed out. So I never looked at that as a sustainable, attractive thing that anyone other than extreme radicals would do. And yeah, it looks like intermittent fasting probably is going to get us most of the way there, if not all the way.

Siim: Yeah, well I want to also add that although someone may be eating like 1200 calories a day just to practice caloric restriction and they hope to live longer, it doesn't mean that they actually gain those benefits because you have to also take into account metabolic adaptation. So they say that you have to, to gain the benefits of caloric restriction you have to reduce your calories for like ten to twenty percent and make sure you won't experience malnutrition but the problem is that if you're eating ten/twenty percent fewer calories over the course of months and years then your body gets used to it and you have to drastically reduce those calories again. So you're going to end up having to consume like 40 percent fewer calories than you normally would and etc., etc. So it's not very sustainable.

Dave: You're just becoming a breatharian at a certain point. You have your one leaf every day.

Dave: This idea of cycles where some days you eat a normal amount of calories and some days you don't, it just works. Even the whole keto perspective - it's always been hey, ketosis or I'll come out of ketosis, go back in versus just staying in it forever and we're going to get into that in a bit. But first up, you do a really good job of talking about catabolism versus anabolism, I hate that word, and versus an anabolic state. Can you talk about the difference between the two states and what intermittent fasting does?

Siim: Yeah, for sure. Well, if you look at the way your body works then your body's always kind of trying to monitor the nutritional environment that it is in and for that it has developed these different fuel sensors that detect the energy status and the nutrients status of your body at any particular moment. Those two nutrient sensors are mTOR which is mechanistic thoracic rapamycin and AMPK and they are almost like the two sides, the yin and yang of your metabolism that are constantly balancing each other out. So mTOR is the main growth pathway that stimulates cell growth, repair and anabolism and AMPK is the catabolic side which is more like breakdown and recycling that kind of forces ketosis that also promotes autophagy and enables the body to clear itself out.

Siim: So those two things are constantly being balance on the 24 hour period and when you're fasting then you're more catabolic. You're breaking things down, you're activating AMPK, you're suppressing mTOR and when you're eating then you're doing the opposite. You're inhibiting AMPK, you're becoming more anabolic and you're activating mTOR just so you can repair. So that's why intermittent fasting refers to cycling in and out of different sides of the coin. So going catabolic, you gain the benefits

of the self-repair and every once in a while to go into the anabolic side so you can actually build tissue and not waste away.

Dave: The way you explained that, a 24 hour cycle so there's times when you have a lot of one, a lot of the other. It seems like when I really peel back the label on a lot of the bio-hacking techniques that I recommend, whether it's the nutritional supplements or even a lot of the machinery from Upgrade Labs. There's a way to induce in like, cryotherapy where oh, I'm getting- I guess in Celsius 160 degrees below zero, but it's only for three minutes but the idea is that is a really deep valley of temperature, way beyond what your body would normally expect which causes a strong adaptation response. And then the same thing for, we call it the cheat machine but it lets you exercise against something that's not gravity and it puts on muscle about three times faster than normal things just by changing the slope of a curve.

Dave: So if you believe that idea that the body will adapt based on the height of the peak or the base of the trough, it would follow that two of the techniques for changing mTOR and AMPK pharmaceutically might be a good idea. So for AMPK, what people recommend is one of two things; metformin or betaine, essentially herbs and on the other side you can take rapamycin. Do you use either one of those?

Siim: I don't use either metformin nor rapamycin although I have seen very promising research about it and I do think that it can definitely work in inducing autophagy and suppressing mTOR and it can be somewhat of a good strategy for someone who is interested in dipping into autophagy more frequently, etc. Also some of the negative side effects related to metformin, I think they are somewhat over-exaggerated for someone who is healthy, someone taking metformin infrequently, etc., then I don't see a huge issue there. I think that would be- I would just maybe try to wait for more human trials before I myself start drinking it but I do think they take other similar compounds like berberine for instance. Berberine is essentially a very similar kind of a drug or a natural supplement that also mimics the similar effects as metformin-

Dave: I said betaine and I meant berberine earlier so thank you for that correction there. I started taking metformin somewhere around 2007, 2008 when the first studies came out and this company called BioMarker Pharmaceuticals went and did all these studies on life, the life-extension studies of metformin said hey, this old diabetes drug, if you take it in a different dosing thing has effects. So I took it for about three years. I ended up meeting the founding team at BioMarker and they couldn't believe I'd been doing it and I said yeah of course I started doing it after the first paper came out. Why wouldn't I? Because I've basically been suffering from the diseases of aging when I was young and I don't like this.

Dave: I quit though because some other studies came out that showed that it could have mitochondrial suppression. And I'm right on the fence of going back onto it because for the last eight years I've taken berberine, just like you talked about but a recent interview with James Clements, we talked about the fact that there are some studies that show that that herb can cause cardiac issues including low heart rate and low blood pressure, including some life-threatening things like that. So the idea that you might

have a sudden drop in your blood pressure because you're taking this herb, I mean sudden as in you pass out sort of thing, maybe, maybe it's worth looking into that.

Dave: So I'm debating. Would it be wise to do low-dose metformin on an occasional base just to increase my cellular cleanup? And I know you're not a doctor and you can't make recommendations and stuff like that but if you were talking to someone who is late-40s, metabolically healthy, wanted to live for a very long time, what would you- given all the research you've read, what would you think about?

Siim: Yeah, that's a very, very good point so to say. That these drugs, they work and because they lower your blood sugar and they drop insulin a lot so the reason you want to actually cycle between those states is an important thing because you know, if you combine all these different bio-hacks like intermittent fasting, taking metformin, doing high intensity exercise, eating keto, etc., then it becomes a, the hormetic stimulus, so to say, becomes somewhat overbearing for your body to endure. That's why it's, everything is the poison is in the dose so I think doing it cyclically is the key. You don't want to be activating the, you don't want to activate autophagy all the time. You don't want to be taking berberine all the time. You don't want to be in keto all the time and at the same time you don't want to be anabolic and you don't want to be activating mTOR all the time. So the key is cyclical and variation and I myself usually, when I take berberine then I combine it after like some form of a higher-carb meal just so I can lower my blood sugar faster and I can go back into autophagy and ketosis faster as well.

Siim: So yeah, I'm not taking it on a consistent basis-

Dave: Okay.

Siim: But if I would take them then I would combine it like strategically around those times where I would know that either my blood sugar is going to be slightly higher or my insulin is higher.

Dave: Why don't you just use vanadyl sulfate and chromium after those meals, doesn't that work better anyway?

Siim: Yeah, you can take them as well but depends on what kind of a, you know, I think there's not going to be a much huge difference. Depends on how much, let's say in the example of cyclical keto depends on how many carbs you're eating or how high your blood sugar actually goes.

Dave: Do you worry about low insulin?

Siim: I would worry about it if I would start to see some negative side effects in my metabolism or my thyroid functioning or like muscle development, so to say. Lower insulin levels are being shown to be associated with greater longevity in other species but again, I think it's a matter of cyclical aspects that you don't want to be probably-

Dave: Yeah.

Siim: Suppressing it all the time because insulin has many beneficial effects. Like a lot of the low-carb keto people, they tend to villainize insulin but-

Dave: Yeah, bad idea.

Siim: insulin is one of the most anabolic hormones and it's very useful but only if you activate it at the right time and you do it strategically.

Dave: It's funny that there's a thing called IGF1, insulin-like growth factor. It's insulin-like because it does what insulin does which makes you grow. In the research for "Super Human", my anti-aging book that just hit Amazon, I talk about risk of all cause mortality in humans from studies from high insulin versus low insulin. Chronic low insulin is more dangerous than high insulin however I wouldn't want high insulin either. What you want is a well-regulated metabolism and of course, just like you've said already twice in this show, maybe you should be in ketosis some of the time but probably not continuously forever. Which is one of the big keto myths that just drives me nuts and that's why the original recommendations that I've come out with and evolved over the time, it's cyclical, cyclical, cyclical and you're coming out with a lot of new research supporting that from this angle on autophagy.

Siim: Yeah, and the same applies to some of the negative side effects of autophagy as well like chronic autophagy can actually promote tumor metastasis. That if you are, like some of the research that you're saying, that autophagy's amazing for disease prevention and making sure that you don't get disease but if you're already sick then it's essentially, potentially strengthening some of the malignancy. Just because it's like a self-repair process and it doesn't have objective understanding of what's good or bad. It's just, some of the cancer cells may just feed off of it and steal some of the residue that's created by autophagy. So yeah, that's why the cyclical approach is even for autophagy and fasting, much more important.

Dave: You're, I'm guessing, around, a little under 30?

Siim: 24.

Dave: 24, alright, so more than a little under 30. You have talked about how you do twenty hour intermittent fasting and you've been doing it for seven years.

Siim: Mm-hmm.

Dave: Do you do it every day?

Siim: Not every day, I probably have once a week where I'm not fasting that long. I'll probably have two to three meals on that particular day just to break the cycle.

Dave: I've known a good number of young, healthy, especially men, who are just saying, wow I feel way better. My body works better. I have abs, intermittent fasting is something I'm going to do every day for the rest of my life. I love this. But I also do a lot of work with

people at all age ranges, especially because I do anti-aging stuff, I've got people in their 70s, 80s, 90s. As well as, you see, a bunch of CEOs who typically aren't in the best shape although that's changing these days. Most of them, if they're not already on a pretty advanced regimen, if they start intermittent fasting every day, especially doing it for 20 hours like you do, what happens?'

Siim: I think that for older people it's just very more, they have to be more careful with what kind of foods they're eating and making sure that they get more nutrients during the feeding window because as you get older, you naturally experience this decline in growth hormone, testosterone as well as anabolic resistance. So it becomes very difficult, it becomes more difficult for you to maintain lean muscle tissue and maintaining lean tissue is incredibly important for longevity and anti-aging. So generally the way I can see that it can be bypassed is to just increase the protein content of your diet a little bit as well as the nutrient density and also shortening the fasting window.

Siim: As your older or as your under some extreme nutritional stress, whether that be from high-level exercise or being pregnant or being underage, etc., then for them they can just adjust their fasting regimen by shortening their fasting window and they can still gain the same benefits. Because they don't need to be fasting that long to, for their body to go into this self-repair mode.

Dave: That's a really good nuanced answer that matches my experience. It feels like there's, essentially it's a stress on the body doing intermittent fasting, right, and if you're not in great shape you might want to start intermittent fasting three times a week. You might want to say, well today I didn't sleep well last night, I feel like crap and I'm going to be flying to New York so, you know in fact if you're flying I still think you should fast or at least have some Brain Octane before you go to get some ketones there but, I just question whether that advice that it works really well when you're under 30 and exercising a lot and managing life differently than when you're 50 and chronically sleep deprived and stressed and doing things.

Dave: So I would just caution listeners; yes, intermittent fasting is a powerful technique. It works differently for men and women and it's okay to start slow and it's okay to be cyclical but you will end up, probably the way I am where, if I have an intense day I actually will do Bulletproof Coffee where I do get some ketones in the morning but my insulin stays perfectly flat. I know you mentioned Bulletproof Coffee somewhere in the book. You say it's at least part, at least part science and part hype if I remember right. We'll talk about that later but I'll do that and if it's a day where I'm like yeah, I'm just going to be sitting around doing a podcast or something like this morning, all I did was I had a bunch of strange herbs and supplements and a big cup of black, Bulletproof Coffee as in I use the mold-free beans.

Dave: I would say, for the average executive or the average person with an intense life, if they're starting intermittent fasting, how are they going to feel at 11:30 in the afternoon- or in the morning. You know, the first time they skip breakfast, what usually happens?

Siim: Yeah for sure, like if you haven't done any form of fasting before then, and you're coming from like a sugar-burning metabolism then it's going to be really difficult to get to it because your body isn't used to using ketones and I think, yeah definitely the Bulletproof Coffee is an amazing thing for teaching the body to become more fatted up and to start using ketones. So although the fats you get from Bulletproof Coffee, they actually promote some form of autophagy which is like a subcategory of autophagy called chaperone-mediated autophagy. So that's the type of autophagy is stimulated by keto bodies and is more of a specific type that just targets specific proteins. Mainly [inaudible 00:30:34] so you can definitely maintain this state of autophagy even if you drink Bulletproof Coffee and if you combine it with some form of time-restricted eating then you're getting increased basal autophagy even. So yeah, it's a very effective strategy for building fat adaptation and even gaining the benefits of autophagy.

Dave: You know I didn't have any idea that you were going to say that but I'm grateful you did because I've been saying for years look, I do not have a double-blinded clinical study that shows you when you put some Brain Octane in your coffee or butter or the whole Bulletproof Coffee recipe, that it will do the same autophagy but all the observations I've had are that when me or others, when we drink Bulletproof Coffee, only in the morning, without even adding the Bulletproof Collagen stuff to it because that would be protein, it changes the effects, that there's definitely a form of autophagy happening and it may or may not be the same as if you just had coffee, tea, water or zero calories. And you're saying that at least the chaperone-mediated type's there. Well what's missing? If you don't have Brain Octane or anything that enhances ketones, what's the other kind of autophagy besides chaperone-mediated?

Siim: Well the main form of autophagy is macro-autophagy and the other form of, like a soft form, is also micro-autophagy. So I'm not sure how big the difference is between chaperone-mediated autophagy and macro-autophagy but I would say that macro-autophagy would just- the effects or the metabolic effects would be somewhat greater because you're not, you're keep the mTOR much lower than you were to be when you're taking some sort of fats. Because although fats, they don't suppress or they don't raise insulin, they can still change the energy status of your cells by changing the ratios between AMPK and mTOR. So yeah, I think the only difference is that with the chaperone-mediated autophagy you will maintain more deeper ketosis and an increased level of ketosis but you may not be getting these sort of more thorough cellular clearance. There isn't like, any research. Like I said, there aren't, there's no research.

Dave: No yeah, we're just, both of us are hypothesizing here but when you read the research enough times you see how it works and you know how it should be right?

Siim: Yeah. Yeah.

Dave: Okay, that was a really complete and impressive answer. And while you were answering that, you probably, 50 percent of the time you looked up and to the right and your eyes twitched. Did you know you do that?

Siim: Yeah I noticed that, yeah I know.

Dave: You've noticed it before?

Siim: Yeah.

Dave: Do you have a weird brain?

Siim: Uh, not sure. Not sure what it means but maybe.

Dave: I mean, I'm asking because a surprising number of people I've interviewed, and this is like more than 600 now, I remember one person, must be, I think it was T.S. Wiley on hormones. She said oh yeah, in college I had a tumor in one part of my brain and when it grew back I had that part of my brain twice as big and now I can read research papers in a way that I couldn't before. She sort of had a superpower. So, I mean, did you whack your head? Did you have encephalitis? Anything like that because you have a really, you're ability to pull information together, you're many standard deviations above the norm, especially for someone who is 24.

Siim: Right.

Dave: So, and one thing you're doing is, you look up and to the right, which, and there's neurological stuff that's beneficial- I tend to look up and to the left by the way when I'm pulling information together but I just wanted to, I'm curious because you've actually do personal development and you talk about energy work and the other stuff.

Siim: Yeah.

Dave: What's your awareness of what you're doing in there and can you make that teachable or share it with our listeners?

Siim: I think I just, it's the way I process information so I'm more of an audio learner. So I'm not-

Dave: Okay.

Siim: When I'm looking into that corner that I'm not actually cognitively visualizing or looking at what I see in the corner. I'm actually looking inside my brain or trying to extract some of the information from there so I suggest it's just my way of processing audio information. My favorite way of learning is also audio and listening to podcasts and audiobooks so maybe it's just, it has become a habit.

Dave: I think it's benefiting you probably in ways that aren't immediately apparent. There are, this actually goes back to the 70s, 80s. There's charts that show which quadrant of your vision your eyes are going to, you're accessing different parts of the brain.

Siim: Mm-hmm.

Dave: So my interpretation of what I'm seeing here is that you're going to a certain part of the brain and giving it more energy when you do that and I'm just wondering if that's a technique that you picked up through all of your interesting research or whether it's just a natural skill, and it sounds like it's just a natural skill, but you definitely have the ability to pull together very disparate concepts very quickly to form a cohesive answer. And the world needs more of that.

Dave: Alright, let's go back to metabolic, what's the word I'm looking for? Metabolic flexibility. What, what is your definition of metabolic flexibility and how can people turn it on as quickly as possible?

Siim: Yeah well metabolic flexibility is just your body's ability to swap between different fuel sources and also being able to function well without any fuel and that refers to generally, like an increased level of fat adaptation and being able to use both fatty acids as well as glucose in different situations. So by default, the body is almost- like when you're born, then you're actually born in ketosis. A mother's breast milk has ketones in it and children are generally, the way that children survive is going into ketosis and that's why they have some higher body fat as well and when you're-

Dave: Kid's brains have to have ketosis, like baby brains? It's vital, right?

Siim: Yeah, and when you are getting older than just because you're eating the standard diet you're kind of losing it. You're losing some form of the keto adaptation because of consuming too many carbohydrates and eating too frequently and not practicing time-restricted eating. So that's kind of a shame and the problem is that, you know, there's nothing wrong inherently with being just a sugar-burner it's just that it may jeopardize your longevity and it's not going to be that sustainable. So if you are running on sugar then you're somewhat metabolically inflexible because you lack the ability to tap into your own body fat stores when you are depleted from let's say the last cereal bowl that you ate for breakfast.

Siim: In a healthy metabolism, a healthy metabolism should be able to go immediately into your own body fat stores whenever you run out of the food that you ate recently because it's part of the way the human body's evolved under and it should be healthy. That's like metabolic flexibility in a sense. If you run out of glycogen and glucose then you're going to immediately go into ketosis, or not immediately but very fast and you'll be still able to use ketones and your own body fat for fuel and especially during times of fasting and low-carb diets.

Siim: The way you promote that is through both ketogenic dieting as well as intermittent fasting and definitely implementing the cyclical aspect because a ketogenic diet is also somewhat metabolically inflexible because if you stay in ketosis all the time then eventually you're losing your body's ability to process glucose as well. You become somewhat physiologically insulin resistant and that's like a beneficial adaptation in the state of ketosis but it's not optimal for metabolic flexibility. That's why going in and out of it teaches your body to swap those fuel sources more efficiently and in so doing achieve more freedom and also flexibility.

Dave: It's made a really big difference for me because, you know, when I was 24 that was, I guess I had probably lost 20 of my 300 pounds. I was probably around 280 at your age and I would've, see it was my fourth year of university, see it would've been like 21 or 22 maybe when I hit 300 pounds. So I, I mean I was in a very different place struggling with this and that knowledge just wasn't out there. Where I've ended up is I pretty much have background ketones all the time and I don't eat zero-carb or near zero-carb diet on many days of the week. Some days I do, some days I fast like you, mixing it up is really important but when I do eat I put Brain Octane on my food and I can reliably get a .3-.5 [inaudible] of ketones on a blood stick.

Dave: So what I'm doing is having more than mother nature would normally put in there in ketones and there's some carbs but not too many carbs and since the cells can pull from both of those, metabolic flexibility happens and you throw in the intermittent fasting. You throw in 24/48 hour fasting and your various exercise and whatever else. It feels like my energy levels are higher than they've ever been, probably because they're both there but it doesn't necessarily require two weeks of extreme bacon only keto sort of thing. What's your take on these background ketones, the .3-.5 for longer extended periods of time?

Siim: I think it's very useful in a sense. So you get the neurological benefits of ketones as well as the autophagy benefits of ketones while at the same time you're not relying on carbohydrates as a main fuel source and you're not being in a state of hyperinsulinemia. So yeah, definitely like combining them together in some shape or form at least every once in a while will probably enable you to still maintain keto adaptation without completely kicking yourself out of ketosis and without damaging your metabolic health in so doing because there's a difference between just being in very strict ketosis and being keto adapted. So being in ketosis would mean that you have higher levels of ketones and the deeper stages of ketosis that usually start around 2.0 [inaudible] and up to 5, etc. So that would be like a state of nutritional ketosis but it doesn't really mean that you're very keto adapted. You can have a lot of ketones but you're not maybe able to use them.

Siim: On the other hand, being keto adapted means that your body actually uses them for energy and that can actually be registered with a slightly smaller amount of ketones as well. As long as you have enough energy throughout the entire day and you don't feel like you're deprived of energy and you need to have another bagel, so to say. So if you're keto adapted then you're able to function much more efficiently without higher levels of ketones because your body is burning them for energy instead of just storing them in the blood stream.

Dave: I've often talked with, especially the, I'm going to call them the keto bros, the radical fringe of keto dieters who have a lot in common with the radical vegans. Where it's like, if you ever eat a gram of glucose or carbohydrate again you're a bad man. Like guys, I've been there and it gave me leaky gut and food allergies and my sleep went to hell and my testosterone went down and you're probably not going to like- in fact it will probably make you angry all the time. Oh wait, are you angry right now? Oh you are! You sort of...

Siim: Yeah. [crosstalk 00:42:40].

Dave: I mean you've, you've seen these guys online. You know, it's probably a lack of glucose for the glial cells in their brain to perform synaptic pruning. So I- man I'm going somewhere with this question but I just woke up and something's not kicking in my brain. I have this cool thing- in my twenties, this kind of thing where I'd lose my train of thought would happen to me 40 times a day. It was just the same thing and it drove me insane and I just learned to sort of fake it and I'm to the point now where it essentially rarely if ever happens and it's happened to me twice this morning. So I'm really scratching my head like, all right. Um, I know my sleep quality was weird last night and I had a half a glass of 2013 French wine and I didn't feel normal after it and I'm wondering like something's not right metabolically in my brain because I just would never lose that.

Dave: So now I'm thinking, all right what is the thing I did that caused me to have slightly less cognitive function? Do you do stuff like that as well? Do you track, hey my brain isn't working as well today?

Siim: Yeah, definitely. You know that there are definitely different feedback loops you can pay attention to. Even just like the Oura score or your HRV and average heart rate. So I do notice like for instance, if I eat something bad or if I just react negatively to it or if I eat too close to bedtime then I'll see a slightly higher resting heart rate and also some interruptions in HRV and maybe deep sleep quality. So those would be something immediate things everyone can see that okay, my sleep quality sucks and they can trace back to it. Usually, like nutrition or blue light or something of those things that interrupt with it or also just general, let's say, cognition and focus. Those things can also be effected.

Siim: Especially if you're somewhat metabolically inflexible, then you may experience these dips more often or you may react negatively to bad food more because your body's kind of struggling to deal with it but if you're really, let's say, keto adapted a lot then you probably shouldn't notice a whole lot of difference. Or it depends on how your bad food you're getting and definitely it's a matter of again, the hormetic dose and how much poison are you getting exposed to.

Dave: Yeah, your resilience gets much higher and mine's higher than it's ever been. I do know, from my Oura score, I woke up like five times last night. I don't remember it and that never happens. I get really high sleep scores and I got a lot of deep sleep but less REM than normal. Anyway, I'm just noticing my brain's off a little bit and I'm going there's always a reason and it could just be a shortage of smart drugs but we'll figure that out.

Siim: Well you can't win every day so...

Dave: Exactly. And the good news is, and what I'm going to do now is I'm going to continue my keto bro question because I remember what I was saying for that. So these keto bros will say, I got my keto levels up to five and the other guy's like I pounded this stuff that tasted like gasoline and now I got my ketones up to seven. And I kind of look at them and then I imagine the adults from the decade that I was born in which to you would be

ancient history, I was born in the 70s. So in the 70s there were these guys going, you know carbs give you energy and then there's these two guys going you know what, I got my blood glucose up to 400 after I pounded all these, you know, sugary drinks and the other goes yeah I got mine up to 450. It seems like in either case, if you're getting the energy, the energy molecule in your blood that high it's because you're not using it and it's probably not beneficial.

Dave: Do you see any benefits to having exceptionally high ketones in the body? Is their presence doing something magic that you've come across in your research that I haven't?

Siim: Probably some of the research by Dominic D'Agostino is showing that elevation of these ketones in your blood stream, with the help of exogenous ketones and ketone esters has neuro-protective effects and used for epilepsy, etc. But I think they're not like, the results aren't based upon super high levels of these ketones. They are somewhat in the therapeutic range and I would also suggest, like you said, that if you have a lot of these energy molecules in your blood stream then yeah, it means that you're not really burning them and at the same time, any excess, whether that be glucose, whether that be protein, whether that be fat or ketones, any excess isn't something that your body actually wants. Your body wants to maintain this very tight range of energy and higher, even a higher metabolic rate isn't beneficial for longevity because it's going to essentially wear down your mitochondria and high levels of energy in the blood stream may also just indicate that first of all, you're not using it and secondly, it's going to start to ravage or damage some of the healthy cells in so doing.

Dave: That is a well-thought out, rational perspective on it. I would, I've definitely interviewed Dominic. I think he was around episode 80 of the 600 and something, so several years ago, and I think one other time since then. What I haven't seen in his research but haven't asked him personally is whether, if someone with cancer who's doing hyperbaric therapy, whether having a level of four versus three on their ketones has any statistical difference or whether it's just having enough ketones that they're abundantly available...and I, I don't know.

Dave: What do you know about things like candida or even cancer using ketones as a fuel source?

Siim: Well I do have heard that it's useful for treating cancer and even fasting plus keto and hyperbaric and that can be a somewhat effective strategy but I've also seen some conflicting research in some extents. Especially from autophagy research that some form of autophagy isn't always good when you are having this sort of malignancy and even bacteria, even some bacterial infections aren't ideal to treat with fasting and autophagy. So yeah, I think it's supposed to be a very context-dependent thing and very dependent upon the particular type of cancer and disease. So probably some intermittency is again, some of the critical aspects and combining different strategies and not relying solely on one thing solely because you read online that fasting cures cancer and ketones too. So you have to be very, kind of, diligent about it and actually work with someone who is, you know, doing it professionally.

Dave: That is a wonderful thing to remind listeners of. I have a friend who said, you know, I have breast cancer. So she went and did an alternative treatment that didn't work but she was, sort of, so scared to know whether it worked or not that she didn't go back to get a scan to see if it worked or not. It was one of those ostrich moves where you put your head in the sand and of course, the thing didn't work. Although it could have and so it resulted in a much bigger procedure unfortunately. She made it but what that all means is, the type of cancer you have, some of them can survive on ketones and people say, I'm going to starve my yeast infection. Newsflash: candida albicans, which causes the majority but not all yeast infections, there's other species of candida that are a problem, but candida albicans can and does eat ketones as a fuel source, as well as glucose.

Dave: So, the idea that you're going to just starve it, it actually doesn't work that way. I'm intrigued because I meet the classical definition of someone who definitely had multiple metabolic problems and chronic illness because when I was young, you know, chronic fatigue and fibromyalgia. Toxic mold poisoning was probably the root cause of some of those and pre-diabetes and high blood sugar and high stroke and heart attack risk and all kinds of bad stuff, right? You take someone with that set of just, unfortunate situations like that and then you say oh, go hack yourself. Well, okay I did that.

Dave: Fortunately I was in a position where I made some money that I lost later but I ended up spending hundreds of thousands of dollars hacking myself and I became a pretty substantial expert in it because there were no experts to tell me, oh by the way Dave, you can't starve the candida because of course I had candida as a part of all that. When you live in a moldy house you get yeast infections inside your gut. Right, but today, I mean, your book's out there. There's abundant knowledge out there and there are functional medicine doctors who can sit down and they can actually measure the yeast that you have and say oh, this yeast is susceptible to...and they can tell you the compounds, and one compound may be caprylic acid. Which is awesome and sometimes it's not caprylic acid.

Dave: By the way, there's another name for caprylic acid. If it's triple-distilled, made from coconuts and filtered by clay in the United States to extreme measures, the name for caprylic acid would be Brain Octane. It's C8 MCT is what caprylic acid is. And it's one of those things, you could say oh, it doesn't. It either, if you have the stuff in your gut that's susceptible, it is but it's all measurable now and it wasn't before. So you are, if you're fat or you're tired or you're feeling hopeless, you're living in a time of just shocking abundance of knowledge, information and tools to fix all that stuff. So you can use Dr. Google and you go in to a real doctor and the real doctor can help you with some tests and help to guide things like that.

Dave: Just like Siim is saying here, in that you can get some good advice and if you're dealing with, you know, something as big as cancer, you better get that good advice but you might want to get multiple viewpoints and you might want to try more than one treatment because that's okay.

Dave: All right, I'll get off my soapbox there. I'm supposed to be interviewing you but I get passionate about this. You pushed a button for me Siim.

Siim: Yeah, I think you have to kind of remember that your body's always adapting to what you throw at it. So imagine if there is this trench warfare between your healthy cells and bad cells and if you consistently throw mortar shells on your enemy, which is the cancer cells, eventually those cancer cells, they're going to dig in and they're going to build bunkers. They're going to build castles and that same mortar shell is going to have less of an effect. So that's why, even the bad cells are also adapting to the treatments that you're throwing at and that's why it's important to do them short-term and also look at it where you're throwing your mortar shells and what's the effect and then changing your approach so that you actually break them down.

Dave: Teaching the world to be cyclical in its approach to maintaining our own hardware is a great act of service. So I'm happy that you're carrying that through almost everything you talk about because man, I did not understand that for many years and you can be harmed by eating sugar all the time or never eating any carbs all the time. So I think we both fundamentally agree on that and speaking of harming yourself, this is one of my favorite questions people ask me but because you're also a bio-hacker for a while. What is the worst outcome from a bio-hack you've ever experienced? I mean, so I'm going to try this on myself, what backfired the worst?

Siim: Well I haven't had any huge failures in my experiments. Before I started keto then I already listened to your podcast and gained some good tips on how do you start it and how to avoid MTT explosions initially starting.

Dave: Oh yeah. Disaster pants wasn't a part of your life, lucky you.

Siim: So luckily I was fortunate in that sense but I would say that maybe, just general, when you are doing these bio-hacks and you listen to things about fasting, ketosis and HIIT cardio and cold therapy and ice baths, etc., then you kind of want to put them all together and combine. So I think I haven't had any serious negative effects from it but just general, maybe somewhat, hypothyroidism a little bit for a short period. Feeling somewhat cold when you're fasting for too long or just feeling not that energized because you're putting all those stressors onto your body and you're not giving it enough time to recover. So yeah, I've definitely learned that that's why not going too enthusiastically into those things and not trying to maximize everything else you do and actually giving your body a break and allowing it to recover. That's where most of the magic actually happens, so yeah.

Siim: Even, I heard it from Dr. Mercola but he heard it from Valter Longo, and he said that the miracle of fasting happens in the re-feeding. So that essentially kind of describes the entire process of hormesis and general stress adaptation.

Dave: That is beautiful, it's making it about recovery. Your point there is very nuanced as well though. Saying, if you wanted to stack up all these things, you're probably going to have more problems. One of the big efforts that I'm working on right now is at Upgrade Labs. So Upgrade Labs is the experiential bio-hacking spin-out of Bulletproof. So this is our answer to, sort of the big exercise industry where we all basically chase tigers and lift rocks or variations on those things and I'm just thinking there's got to be a better way. But how do you know if you're going to walk into Upgrade Labs, should you do the

intense red and infrared light therapy first, then cryotherapy and then do the thing that makes you triple your muscle growth versus lifting rocks? Or should you do this unusually timed cardio with cold compression on it? There's all sorts of paths through the technology.

Dave: So we're building artificial intelligence and machine learning to look at your current state, how much recovery, how much stimulation. So no one knows. We have trainers who know. We have theories and we have best practices and things like that but I want to validate and test and iterate the best practices and maybe some of that knowledge will come out. And in another couple years, the bio-hacks you just mentioned, Siim, we'll be able to say, if you were going to do an intermittent fast it'd be amazing what happened if you jumped in a sauna ahead of time because this combination of heat shock protein is going to be great and if you did some really weird breathing exercises to create hypoxia, that would also be good because you need an elevation of HIF 1 factor.

Dave: Nobody knows because we're testing single variables now and we actually live in a multi-variable world. So I guess what you're saying is you mix your variables, you might get, especially all go in the same direction, you might get negative results.

Siim: Yeah, for sure. Like you said, everyone has their own requirements and everyone needs different approaches and probably someone who is metabolically unhealthy needs a different type of fasting routine than someone who is very healthy and already in ketosis, at least keto adapted. So yeah, there's different ways of doing fasting. There are different ways of taking Nootropics. There's different ways of doing HIIT cardio and it all depends on the particular individual and I like that you said that we're going to develop these artificial intelligence to actually tell you what even, on the nutritional level, what kind of food actually fits your genetics and what's your microbiome status, etc. So you know, exciting times that are coming out and we can individualize and personalize all these different strategies.

Dave: I love it that you just mentioned that. We both use the Oura Ring and Harpreet's been on the show to talk about it and I think this is the best piece of tracking tech that I'm aware of and I was CTO of a wristband tracking company earlier, not that many years ago. Now, so that's one. In terms of gut bacteria I use the Viome test. I've been involved with the company since the very early days. Do you use Viome or do you use anything else to look at what's going on in your gut?

Siim: No. The Viome, they don't ship to Europe yet so I'm waiting until they do. So, I'm a little bit behind that but I do take-

Dave: Well next time you're in the US, have it sent to your hotel and your information will go to Europe so I usually do mine in a hotel in the US because it's faster but okay.

Siim: Yeah for sure, I'll have to do that and but yeah, I do general blood tests and just the organic acid test every once in a while to pay attention.

Dave: Organic acid? Okay. I love organic acid tests for mitochondrial function. What about either inflammatory cytokines or food allergy panels because one of the things keto people can get is food allergies if the lining of their gut doesn't have enough mucin. Have you tested?

Siim: Yeah, I have but I haven't had any problems. I've seen that my kind of body is very able to handle even gluten and so on so I don't have any allergies to dairy or something like that.

Dave: So you come from good stock and you live in a part of the world where, until last year, Roundup was banned. Give yourself another 20 years. Although, it's looking like Bayer might not be liking life because they keep losing lawsuits over all the bad they've done to the bacteria ecosystem of our planet with their stuff. So, sorry guys. Maybe everyone in Europe won't get food allergies the way they did here.

Dave: All right, is there anything else about autophagy that you wish the world knew that they just don't get? What's missing?

Siim: There are many other ways of also activating autophagy besides caloric restriction and fasting. A few of those that we've already mentioned like saunas, high intensity cardio, heat and cold exposure, they also are other ways of stimulating those same longevity pathways without having to essentially starve yourself. You can gain a lot of these beneficial effects or lifespan, as well as metabolic health and metabolic flexibility by implementing these things. So maybe one of the best strategies everyone should do regardless of whether they're bio-hacking or not is resistance training, building muscle. Even taking regular saunas and some form of cold exposure as well.

Siim: Those are part and parcel of every bio-hacker already but I think the emphasis shouldn't be to kick your ass all the time and do a lot of stressful activities but also actually allow your body to heal and use those things as a form of recovery.

Dave: Siim, at 24 years old you just displayed an amount of wisdom that I probably really get until I was 40, around that. Hey, it's okay to be kind to your biology instead of just pushing all the time. So I'm damned impressed. That is awesome.

Siim: Well I've had good influences in the sense that if you are, like you said earlier, that we have access to technology and information so you can learn about all those things already and you don't have to make the same mistakes other people have made. So I'm actually supposed to be not making those same mistakes because otherwise we would be going downward as a species.

Dave: Very cool perspective. Perhaps I was just too egotistical to learn from my elders and that's one of the reasons that now I cultivate friendships with people in their 70s and 80s and 90s because they know more stuff than I do. It's kind of amazing. It's almost like they've lived another 50 years than I have.

Siim: Exactly.

Dave: That's really cool. Well kudos for the amount of learning and your unique ability to synthesize knowledge. What do you do for blue light blocking? Do you have True Dark glasses? If not I'll send you some but do you just use dimmer switches? Do you put stickers over the LED lights? What's your basic strategy there?

Siim: Yeah I do have True Dark, like the Twilights.

Dave: Oh you do? That's cool. I'll send you some anyway if you want but-

Siim: The Twilight and the Day Walkers as well so when I first got them then I noticed a huge improvement in my deep sleep and actually I guest posted an article on True Dark's website as well where I talked about-

Dave: Oh thank you, I didn't even know that.

Siim: Yeah, it was just released a few days ago but yeah. I saw an improvement in like 15 percent of deep sleep just by using-

Dave: 50 or 15?

Siim: 15. 15.

Dave: Okay.

Siim: Yeah so I saw just because of blocking out the blue light it did show a higher score on my Oura Ring. So that's a huge thing and other blue-blocking mechanisms or things I use, just filters on the smartphone such as on my Android it's Twilight and on my PC it's [inaudible].. So those are the easiest ones and also just not having bright lights around the household in evening. That's pretty much because I've seen some research showing that the blue light can also interrupt with melatonin through the skin so there are some receptors in the skin as well so you don't want to be bathing in bright lights when you're about to go to bed.

Dave: You know what's really cool, I've been maybe one of the loudest voices saying that, look we have receptors in our skin, this is an issue. However, when I talked with Satchin Panda about that he said, Dave yeah I saw the same study and Satchin Panda is a researcher from the Salk Institute who's just wrote a really good book on time-restricted eating and just a fascinating, passionate guy and he said Dave, that study looked pretty good but then I really went in on it and what they had done is they had taken a bright, bright white light behind the knee all taped up or no light at all and the people couldn't tell. There's no way to know whether you were getting the light or not and then they said oh look, when they have this light the sleep quality's no good but there was a TV on in the room.

Siim: Wow.

Dave: And there was the, but there was a TV on that they didn't control for and that that was almost certainly a major confounding factor and that subsequent studies had found that there are photo-receptors in the skin but you're unlikely to effect the Circadian clock and the SCN or the core clock in the system but you might have some more aging or photo-aging of the skin or something if you're sleeping with lots of blue light. I still would say, you should sleep in a perfectly dark room.

Siim: Exactly.

Dave: But I'm less concerned about there being a little bit of light on my skin than I used to be based on all that stuff but I still think, why would you not dim your lights at night?

Siim: Exactly, why wouldn't you take advantage or why not be cautious in a sense? And you don't have to be definitely neurotic about it and be scared of some blue light on your skin, you just have to kind of know that it's probably not as detrimental as blue light through the eyes but at the same time if you're already home, then just dimming down the lights, it also psychologically calms your mind and makes you prepared for the sleep. So even the psychological effects can be significant.

Dave: Beautiful. Final question for you Siim. How long are you going to live?

Siim: That's an interesting question. When I did a podcast with Dr. Mercola a few days ago he asked me the same question because he knew-

Dave: Oh is he asking that question now too? That's cool.

Siim: No, he asked me because he knew you were going to ask it so I'm going to give you the same answer that I gave to him which is, I'm not that worried about living as long as possible. I'm more focused on making sure that the information and the influence I have on the world would live longer than me or live longer as my physical body because that's going to have a much more significant impact on actually changing the world than me living longer. So I'm not worried about actual immortality. I would be much more concerned with legacy and being remembered for something that actually changed the world.

Dave: Very cool, very nuanced answer. Don't you feel like though, if your physical tissues lived longer that you'd have the ability to have a bigger impact on the world?

Siim: For sure.

Dave: That's what's motivating me.

Siim: Exactly. Yeah, that's another point and a nuance that with the advancement of technology and other bio-hacks we will probably increase the average lifespan of many people but at the same time it's not inherently dependable on me. I'm not the one who is going to create those technologies. I'm the one who is going to have to maybe test them out or something but it's not solely dependent on me so I'm not focusing on that

but yeah, I would suggest that if you were to be living several hundred years, 500 years, etc., then the impact on the world would be different or more on a grander scale. But at the same time you also have to be mindful of the fact that if you are living very old, then it's also going to impose many different kinds of problems on society and culture that we don't really comprehend at the moment because we don't have those challenges.

Siim: So yeah, it's a fun time to be a part of this sort of a change in human biology.

Dave: It is and one of the reasons I'm asking you this question specifically is, since you started university, you've been bio-hacking. You know more about anti-aging now than anyone at any age did 20 years ago and you practice anti-aging as a young, healthy human. Okay? That is awesome and I'm thinking, I know where I am right now and if I could come back from the crappy start that I had, I think, man what would happen if I did all these practices when I came out with a good start and I started, you know, in my late teens? The outcome, like way you look when you're 70, even if you don't apply any of the stem cells and advanced anti-aging technology and all that stuff, is going to be shocking to your peers who eat a crappy diet and all that sort of stuff. Completely shocking.

Dave: What I want to know is what's going to happen, what it's going to look like so the only way that I can think of to know what you're going to look like when you're 100 is for me to be around when I'm , whatever 140 or whatever I'm going to be to be like, wow you look a lot better than I do! That's great. So I would encourage you to live a long time.

Siim: Right, yeah, exactly. It's going to put more pressure on myself to actually hold up to it or live up to it.

Dave: There you go. Well your website is siimland.com. You've got a bunch of cool stuff up there. Your podcast, Body Mind Empowerment is doing very well, you've got more than a hundred episodes out there and kudos for that. Probably most people give up after 20 episodes when they realize it's actually work to do a podcast. So you made it way past that barrier, and thanks for being on Bulletproof Radio.

Siim: Well thanks for having me and I'm glad to talk with you.

Dave: If you liked today's episode, you know what to do. Pick up a copy of "Metabolic Autophagy" if that's the kind of light reading that makes you happy and if you do decide to do that, you owe it to yourself to go to Amazon and leave a review for the book and here's why you owe it to yourself, because when you review a book you're expressing gratitude and when you express gratitude it extends your telomeres by 47 percent. Okay, I made up that last fact but the bottom line is, expressing gratitude actually does feel good and it really helps us authors know that what we're doing is worth the time and energy it takes to write a book.

Dave: So thanks for deciding to review whatever it is you read because we actually do see it. Have a beautiful day.

