Transcript of Podcast #10
The Man Who Would Stop Time
The Bulletproof Executive

Cool Fact

Dave Asprey: Today's cool fact of day is that collagen is not just for skin and hair. It's the matrix for your bones and it forms a part of your body's electrical system that conducts current apart from your nerves.

Overview

Dave Asprey: You're listening to episode ten of Upgraded Self Radio. Today we have an interview with anti-aging expert Bill Andrews, who's an expert on telomerase, a part of your cells that gets shorter every time they divide. Bill believes, after a lifetime of research, that by fixing the problem with telomerase we can extend human lifespan very substantially. It's a fascinating interview and I had a great time speaking with Bill. We also have an awesome listener Q&A where we discuss smart drugs, the difference between farmed and wild salmon, omega-3 oils, grass fed beef, ways to grow taller, curing lactose intolerance, chest pain and butter, testosterone, and fixing poor vision. If you are an entrepreneur, you're a business person, a father, a mother, a student, it doesn't matter. Knowing all this stuff is going to make you perform and feel better, and that is what this show is all about.

We close with our biohacker report, which is where you will hear a brief summary of three new pieces of research that help you treat osteoporosis with fish oil, keep your kids safe from the negative effects of mobile phones, and how your brain acts to improve your own performance.

I am also proud to announce that we just created a t-shirt that has "Powered by Butter" on it with a pretty cool icon of a cow. It's available on our website at bulletproofexec.com or upgradedself.com.

If you'd like to learn more about us, you can find us on Twitter on @bulletproofexec. You can get in touch with us on Facebook or sign up for our email newsletter.

Updates

Dave Asprey: Alright, Armi. What biohacks have you been working on this week?

Armi Legge: This week I have been working on improving my sleep. I've been having trouble getting to sleep for a little while now, about a week, and I think it's probably because the days

are getting shorter but I've still been staying up for about the same amount. I'm going to try to move my sleep forward so getting up a little earlier, going to bed a little later and hopefully that will help fix that problem. What about you?

Dave Asprey: It's kind of funny. A lot of people aren't really aware of it but on the day that daylight savings happens the number of car accidents goes up really dramatically as people deal with the disruptions in their sleep and the problems with their biology that come about from that rapid shift.

My biohack is a relatively simple one. I flew to China and back in five days. I was on the ground there for about two and a half days and I got back and was, not surprisingly, a little bit tired, but I had a full day of meetings. So I landed at 10 am, I had meetings all day, and then I really needed to recharge my batteries. My biohack was a dinner of a pound of grass fed meat that I cooked in my hotel room, which had a little kitchenette. I cooked it in butter and for breakfast, six eggs with bacon and guacamole and I feel rejuvenated. I'm almost buzzing with energy, no jetlag whatsoever. Having enough high quality fat for me just cured my jetlag and made me feel better than I normally do. I'm just completely feeling great.

Armi Legge: Now we are going to move on to our exclusive interview with Bill Andrews.

Interview

Dave Asprey: We're on with Bill Andrews. Bill is the CEO of Sierra Sciences, a premiere anti-aging research company conducting research into telomeres. The company has screened more than a quarter million compounds for telomerase activity in order to discover 858 telomerase inducers from 38 different drug families. He was recently in Popular Science as the man who would stop time and Newsweek, and Discover magazine and he's about to go, any day now, onto the Today show where you'll be able to hear even more about his new discoveries. We've invited Bill to the show today because the stuff he's doing is important to you if you care about being better at what you do. Staying young means you can be a better entrepreneur or a better parent or a lifelong student or a better artist. Living longer can let you gain the benefit of wisdom you gain over time without the slowing down that can happen as you age and if Bill is right, you can have a lot more years too.

Bill, welcome to the show.

Bill Andrews: Thank you very much.

Dave Asprey: Tell us how you got into the field of aging and why you have such a focused effort on pursuing it?

Bill Andrews: I got into the field because of my personal interest in curing my own aging. Ever since I was a little kid when my father first came up to me and said he didn't understand why nobody hadn't cured again yet and this was 50 years ago. He said "You know Bill since you're so interested in science, when you grow up you should become a doctor and find a cure for aging" and here I am. I've been obsessed with it ever since then.

Dave Asprey: I'd like to thank your father for pointing you in that direction. It's been a lifelong interest for me as well and I really admire the work you've done. It's one of the reasons I formed the Smart Life Forum, the anti-aging group I run that we had to end a couple years ago, to talk about this. So I am really impressed with your work.

Bill Andrews: Thank you.

Dave Asprey: Armi, you had a question here.

Armi Legge: Bill, how do you define aging from a biological point of view so people can understand what we're trying to slow down here?

Bill Andrews: That's a good question because how do you separate health related issues from aging related issues? I kind of think of if it's aging related, it has something to do with some type of clock. I believe there's a clock that must be ticking inside of us. If it's not related to some kind of clock and it's something that varies from person to person, I don't really consider it aging. I consider it a health related issue. Aging is actually gets even more complicated because aging affects a lot of non-aging health related issues. I kind of think there is a theoretical maximum lifespan on humans of 125 years and anything that can cause us to exceed that limit of 125 years, I would just, by that definition in hindsight, call that related aging. It's a really tough question on how to separate the two, health related stuff versus aging related stuff. I can tell you that when someone runs a seven minute mile and they're 130 years old, I will know that person is taking something to cure their aging.

Dave Asprey: I love that goal. That's the type of visionary thinking that a lot of our listeners are into and certainly I think that's possible and I think that will happen sometime. That said there are a bunch of older theories of aging. I've talked to Aubrey de Grey lots of times who has five different theories. How do all these other things, not just Aubrey's, but all the other theories of aging compare to the one you're focusing on?

Bill Andrews: Let me just say I'm a big fan of Aubrey de Grey. I think he's really passionate about trying to find a cure for his own aging and everybody else's aging, and he and I work

together, we collaborate together, even though we're on different missions. I think that aging is multifaceted. I think of each thing that causes aging or maybe even health related issues as I was discussing before. I think of each one of them has a stick of dynamite that's burning inside of our cells and really what's the issue is the stick of dynamite with the shortest fuse. That's what we're trying to solve. I believe there are a lot of theories of why we age. Usually when I give a presentation I show at least 15 of them. I think the main ones are oxidative stress theory of aging, mitochondrial dysfunction theory of aging. It's also known that gene expression changes with aging and so there's a lot of people working on the approach of reversing this gene expression changes and whether that will reverse aging or slow it down. I believe all those things need to be worked on. I personally believe, but can't 100 percent prove it, telomere shortening which I think is the number one cause of aging in humans and is the stick of dynamite with the shortest fuse. It's really the only true clock that exists in human cells that can explain aging and explain the 125 year theoretical maximum. I'm focusing my attention on that but I sure hope everyone else, especially Aubrey de Grey and others working on the mitochondria dysfunction and oxidative stress. I hope they're getting well funded too so they can get their stuff done because once I put out this fuse that I think is the shortest there are still other fuses burning. I'm hoping that those other fuses are long enough that once I put out the telomere fuse I will have at least another 30-50 years to work on putting the other fuses out.

Dave Asprey: I love how you described it "the shortest fuse first". I sort of describe my approach to this as being a biohacker because my background is in computer infrastructure, designing cloud computing things for the past 15 or 20 years. It's the same approach. It's the idea that you find the first bottle neck, the thing that is going to break first and you fix that and then you find the next one. What you're doing is saying I think telomeres are the most important, the shortest fuse, the first thing that is going to break, so let's fix that and others can work on the next thing that might break. That's so smart.

Bill Andrews: Biohacker. I love that term.

Dave Asprey: Excellent. One other sort of question that goes along with that. You have been doing this for 11 years just with Sierra and obviously you've been involved with anti-aging for longer so the first phase of your testing was all about DNA recombinant approach and now you're pursuing some other paths here. Help our audience understand the path you've progressed as you work on tackling the shortest stick of dynamite that we're looking at.

Bill Andrews: I've had one main mission in life every since I first heard that telomeres shorten and could be the cause of aging and that has been trying to figure out how to prevent that shortening of telomeres and actually lengthen telomeres. Even though I've been doing different things, they've all been directed towards that one mission. That mission has been going on since 1993 when I first learned that telomeres could play a role in aging. Now Sierra Sciences has been around for more than 11 years, actually I think approaching 13 years now, and we've been 100 percent focused on that, but then there's different ways of approaching that issue. A gene, any

gene in the body, is turned on and off like a light switch and light switches typically found right adjacent to the gene in a chromosome. So the question is what is that switch? Where is that switch? What turns it on and what turns it off? Our first approach was try to identify what it is and then I think we did a pretty good job of doing that and then once we have defined what it is, then we try to find what the proteins are or the RNA molecules that are involved in turning that off and on. After 7 years of working on trying to do that, we could not figure that out and nobody else in the world has either enough though there are a lot of research labs working on that. We made a decision one day, in 2006 or 2005, to put that approach on hold and go with plan B and plan B was not to try to find out the protein that turned the telomeres off and on. Let's screen for synthetic chemicals, drugs, that when we add it to the cells turn it off and on. Then when we find that drug that turns it off and on, it presumably binds to the protein that we want to identify. The drug is the bait on a fishing line to pull out that protein that is actually binding it. At the same time the drug, even without us finding out what that protein is, that drug becomes a potential therapeutic for turning telomerase on to lengthen telomeres.

That's been our approach so far and we've been very successful with that approach. For years, even when I was first starting at Sierra Sciences, other scientists all over the world were telling me that "That's impossible. You're never going to be able to find a small molecule chemical that is going to turn on the telomerase chain." Theoretically, they said, if there was such a possibility of doing that we would have already found telomerase turned on in nature.

Dave Asprey: What you've done is absolutely used the hacker approach to solving the problem. Them saying that it can't be done then you find another way and you keeping poking at the problem differently and you've found 858 inducers when it's allegedly impossible. It's just a beautiful thing from a technology perspective. I love that you've done that.

Bill Andrews: That's why I like this biohacker term. When we found the very first chemical hit, we did send it to five different labs of scientists that had said that it was impossible. They all tested it and said "Hey, eureka, it works!" and so that was a really big day for us. We do have close to 900 different chemicals that turn on the telomerase gene.

Dave Asprey: Now you've mentioned genetics here and I have a book, Wiley is publishing my book early next year probably, and my book is about what to do when you're pregnant to use epigenetics to have a healthier, more intelligent, and hopefully longer lived child. I look at a lot of the exposomes, the set of environmental triggers that you're exposed to and the regulatory protein shield and look at turning it into practical advice for people. How much of the telomere lengthening or shortening process do you think is genetically determined by the environment versus predetermined genetic switches?

Bill Andrews: Let's say there are a lot of things that can affect telomere length. A lot of people are born with very short telomeres and that's usually due to something in the parents. There are things called diseases of anticipation which are where, for instances, a great-great-grandparent

had a mutation that resulted in telomerase not working very well and therefore in the germline cells of that great-great-grandparent, the telomeres actually got a little shorter. Then in the next generation, the great-grandparents, the telomeres got even short, the grandparents, got shorter, the parents got shorter, and then you they got so short that it caused you to now suffer from a premature aging disease that is Progeria, dyskeratosis congenita, idiopathic pulmonary fibrosis, all of those have come under that kind of heading. The cause sometime is purely genetic, causes the telomerase activity to decrease. The cause can also be epigenetic and sometimes it doesn't even have to involve telomerase. For instance, anything that accelerates telomere shortening could be a problem. Telomerase can lengthen telomeres or at least maintain their length but if you're doing something to your body that can cause accelerated telomere shortening, the telomerase might not be able to keep up and keep them long enough. Examples of epigenetic kind of things, especially in pregnant women or not even limiting it to pregnant women – it can also be women and men before the pregnancy because the germline cells could get effected. Smoking is a big problem. Smoking is known to cause accelerating telomere shortening. Obesity is another one, lack of exercise, depression, on and on. Right now there are so many publications from people finding different things that accelerate telomere shortening that it's become pretty scary because you have to almost have a perfect life to prevent accelerating telomere shortening at all. I think that some of the more interesting ones that have been published lately is simply household income. Turns out that people with higher household income have longer telomeres than people with lower household income and I assume that has something to do with depression. Also pessimism has recently been shown to affect telomere length. It turns out if somebody goes up to somebody else and goes "You think you'll live to be 100?" and that person says no, there's a good chance that person is not going to just because their telomeres are shorter.

One other very interesting sideline is that a study was done showing that caregivers of Alzheimer's patients actually have shorter telomeres. Whether or not these later ones -- depression, care giving, pessimism, financial income – whether or not those affect telomeres and the germline is unknown but they definitely affect telomere length in the immune system. Definitely I think smoking and obesity and lack of exercise will affect telomere length in the germline.

So be healthy. Be healthy and be happy. I think that's the best way to make certain that you don't cause any problems to your unborn child.

Dave Asprey: That is really impressive because if I heard you right, you're saying that what's happening in your mind, your actual outlook on life, affects how quickly you age.

Bill Andrews: Yeah. Anything that causes stress or inflammation and personality traits can definitely cause stress or vice verse. You definitely want to reduce oxidative stress. Even the stress that your boss gives you, that causes all kinds of inflammatory and oxidative stress problems.

Dave Asprey: It's really impress to hear that from someone who has done as much research as you have because the bulletproof program that I've built for myself and my family but that I've been sharing online involves reducing stress, reducing inflammation, and even specific techniques derived from quantitative analysis of heart rate and stuff. Anything that lowers stress, at least unhealthy stress, anything that lowers oxidative stress, nutritionally or in your environment, seems like it's a good idea. It increases performance as well and now, as you're sharing with us, makes you age less quickly. I've seen other data points like that so thank you for that.

Armi, I think you had another question here too.

Armi Legge: Assuming we could active this telomerase enzyme to extend telomere length, what is the maximum you believe it's possible someone could live?

Bill Andrews: I have no idea. That said I wouldn't be surprised if someone lived to be 500 years old but I'm not going to say they are going to live to be 500 years old. I have no idea. All I know is that we can make human cells in a petri dish immortal by all definitions that are possible right now. When we turn on the telomerase gene in the human cells in a petri dish, there's never any signs of aging whatsoever. The cells actually get younger which is actually a really good indication that they'll go on and on and on for a very long time. The highest that I will say is that I think if we can stop telomere shortening and actually make telomeres longer, we can probably live to be 130, 150 years old which is, as I said before, would give me a lot of extra years to work on trying to find the other causes of aging.

Dave Asprey: So it sounds like if we succeed in your mission and the other anti-aging things happening, we may not have to upload ourselves to the internet sort of singularity model? You're not a singularity guy?

Bill Andrews: Oh yes I am. When I speak at conferences, especially at investor conferences, I always pitch not just for my own company but for all the other companies and I focus on the things I mentioned before – oxidative stress, mitochondria dysfunction, Aubrey de Grey's SENS program, the gene expression reversal programs – but in addition to that, I'm all for brain uploading. I think that's science fiction, yes, but I'm pretty impressed with some of the people working on it and I think that they're going to make some progress with the appropriate funding. I'm also into nanotechnology that can help us. Maybe we can figure out a small little molecular robot that can get inside our cells and turn on telomerase or even rebuild our telomeres. One other thing is I'm very interested in cryogenics. If everything I'm doing right now fails to get done in time, I'm going to be the first person wanting to freeze my body when I die so that someone else can take the lead after I'm gone and bring me back after the telomere shortening and other aging problems are solved.

Dave Asprey: So you're definitely then a full fledge biohacker and you have a backup plan in place?

Bill Andrews: Yes.

Dave Asprey: Let's cover some of the specific things that have come up. Some of your most promising substances are actually Chinese that are already used medicinally. For some of our listeners like me who may be ahead of the curve and willing to try some things and see what works, what are the most promising things that you can talk about?

Bill Andrews: Right now there's only two. Every time when something is published or comes on the market that suggests it turns on the telomerase gene, we test it. We just want to know for our own sake, but the only things that actually turn on the telomerase gene so far are TA-65 from TA Sciences and Product B from Isagenix. Both of those are natural product supplements. They are on the scale of what we want to accomplish with our own synthetic chemicals, they are relatively weak but I'll tell you what, anything is better than nothing. I believe that both those products can extend out life spans a little. Surprisingly we've done a clinical study on TA-65 already in conjunction with several other labs including Geron Corporation who discovered TA-65 and we also have a clinical study under way for Product B right now with Isagenix and Dreammaster Corporation. That is underway but the first one did give some indication of possible age reversal. Even though it's relatively weak, we were able to show that the absolute shortest telomeres got longer. It's well published that short telomeres are preferentially elongated over longer telomeres so if you have a cell that has a mixture of long telomeres and short telomeres and you turn on the telomerase gene in those cells, the shorter telomeres actually get elongated preferentially. Since these two products are relatively weak, we're looking at the shortest telomeres because that's the place where we can get our strongest signal and what we do with TA-65 to see the shortest telomeres got longer. That's kind of like interesting because we really don't know what telomeres have to do with aging. That's a big mystery all in itself and I'll be the first one to admit that. We just know that it's correlated and when we lengthen them we can reverse aging in human cells. It might be the abundance of short telomeres which would correlate with the average telomere length or it might be the average telomere length but it is the abundance of short telomeres that TA-65 and hopefully Product B can actually show some age reversal as demonstrated by telomeres. Anecdotally, from a lot of testimonials, there are a lot of people saying that they are seeing age reversal. I get emails and calls all the time from people with TA-65 and Product B saying that they're seeing miraculous changes in themselves but as a scientist I try to steer away from testimonials. I will hopefully have the real scientific data pretty soon.

Dave Asprey: What are you looking at spending? I know you don't work for either of those companies but I'm guessing that you know an approximate like how much would it cost a month to experiment on yourself with some of this stuff?

Bill Andrews: TA-65, I think, is about $200 a month, $250 dollars a month. Product B is about $70 a month. Those are really the only two things to experiment. If someone was interested in taking a quote "telomerase inducer", those are your only two choices right now.

Dave Asprey: That sounds pretty reasonable. Someone who wants to get a few extra years and is willing to take a risk that it might not work, $70 a month – you don't have to be a millionaire to do this. You can probably somewhat extend your life, maybe improve the quality of your life, and thus your performance for a couple hundred bucks a month using the research you're pursuing.

Bill Andrews: Absolutely. I'm doing it. I've got everyone in my family, my friends doing it. I strongly recommend it. The companies can't say this because of restrictions on what you can claim but I sure strongly believe that keeping your telomeres longer or decreasing your shortening will not just have an impact on aging but every single disease you can ever imagine that has anything to do with cell division. Those would include cancer, heart disease, Alzheimer's, osteoporosis, on and on and on, muscular dystrophy, immune disorders. Even people who have AIDS will probably benefit from taking something that can extend their telomeres because of the fact that number one cause of all the ailment cause by AIDS is the accelerated telomere shortening in the immune cells. That's why T-cells disappear in people infected with the AIDS virus. Just keeping the immune system intact there can help them but it can help everybody.

Dave Asprey: I write a lot about intelligence and performance enhancements and ways you can actually safely sleep a little bit less and do what you want to do without necessarily shortening your telomeres or harming you health in other ways and it sounds to me like having an impact on all sorts of chronic diseases that attacks your performance, physically and mentally, for $70 to $200 a month sounds like a pretty good bet.

Bill Andrews: Yes, I agree.

Dave Asprey: I'm with you there and I've been looking back and forth at using both of those substances for awhile but I think you've just pushed me over the edge where I'm going to have to start experimenting on myself with those in addition to all the other quarter million dollars I've spent on myself over the last 15 years.

Bill Andrews: Now, going back to singularity just for a moment. Terry Grossman one time stated that "Live long enough to live forever" and that's really important. Even though you're 65 and probably are relatively weak and things like vitamin D and omega-3s only decrease the rate of shortening don't prevent shortening, those kind of things do give you a better chance of living

long enough to live forever. The idea is live long enough that you're around when somebody comes up with a cure then live even longer when someone comes out with an even better cure.

Dave Asprey: I think it makes great since. There's no doubt that the longer you live, the longer you're going to live. Every day you're here, something new could come out that could change anything.

Now, here's the opposite of this though. You talked about oxidative stress and all these other things that affect telomere length but you're an ultra runner, right? Don't you do long distance running? Isn't that counterproductive?

Bill Andrews: Yes, I try to run 50-100 mile races once a month. I'm really into the spectacular types of runs like running across Death Valley in the middle of summer when it's 130 degrees or running through the Himalayans at 18,000 feet, nonstop for 138 miles.

Dave Asprey: Did you do that in the Himalayas?

Bill Andrews: I tried that last year. My girlfriend and I are both ultra marathon runners. Her name is Molly Sheridan. We both did it last year. I ended up having a gallbladder attack at 50 miles and had to withdraw from the race to be shipped back to the United States to have my gallbladder removed. When she heard I was in the hospital she dropped out of the race at 100 miles but this year she went back and did it and completed it and became the first American woman ever to complete that race. It's considered the longest, toughest, and highest ultra marathon in the world at 138 miles, 18,000 feet elevation. That was an incredible feat but yes, I've tried it and I'm going to go do it next year and actually finish it.

Dave Asprey: How old are you if you don't mind me asking?

Bill Andrews: I'm 59 and 90 percent. I turn 60 in about a month and a half.

Dave Asprey: Well, I have to say that accomplishment is impressive. I've spent time in the Himalayas. I tried sprinting up a hill at 19,000 feet and I laid on my back seeing stars for about 20 minutes afterwards. Granted, I hadn't been training for a marathon before that.

Bill Andrews: Be careful. That's dangerous.

Dave Asprey: Yeah. I figured that out afterwards. I think that I came closer to death than I meant to, to be honest.

Bill Andrews: You have to get really, really acclimated. There are some good ways to get acclimated to the altitude nowadays.

Dave Asprey: Are you damaging you health when you do this long distance running?

Bill Andrews: I'm always testing my health. I get regular blood work every six months. My health is just spectacular and I think long distance running has a lot to do with it. A lot of people would argue that long distance running is a good way to accelerate your aging. That's because of a lot of mouse studies. Humans are not mice and mice suffer tremendously from oxidative stress. They don't have any telomeres shortening by the way. They age by oxidative stress and humans have ten times the resistance to oxidative stress than mice do but that's because humans have the superoxide dismutase enzyme which is a natural defense against free radicals. There's ten times more of that then in a mouse. Studies lately, one from Germany and one from Colorado, have recently shown that the more intense human endurance is the longer your telomeres and the longer you'll live. They've also been able to show that the more intense your endurance the higher levels of superoxide dismutase and other natural defenses against oxidative stress become. Humans do that, mice don't.

Dave Asprey: So what you're doing is you're training your SOD enzymes. Here's a question you may have no comment, you just may not have tried it, but I use ozone therapy to train my SOD defense. I challenge myself regularly with ozone that also has other health effects. Have you seen anything about ozone therapy and telomere length?

Bill Andrews: Not about telomere length but I've seen a lot about ozone therapy and I would probably say that I am not in a position to say one way or another about it but I have to say that there's logic to it so let's see how that turns out.

Dave Asprey: If you ever want to chat in more detail or if you ever want to run experiments on someone who's had extensive exposure to medical ozone, let's connect over email and I would be happy to send some blood or where ever I can help.

Bill Andrews: I definitely would like to hear whatever you have to say on that. I'm always open to that from anyone, whoever has any ideas. Because I'm trying to cure my own aging and I'm very open to hearing what anyone has to suggest.

Dave Asprey: The selfish motivation works for all of us on the call here. Let's move on to the quote "selfish motivation". Tell us, how much money do you really need to fully fund your research? This is ground breaking stuff. I work with intercapital all the time, there's plenty of investment money out there. Is it coming from your way? What do you need?

Bill Andrews: It goes in phases. We spent 33 million dollars getting to where we are right now and that's only since Sierra Sciences got started. With Geron Corporation we spent a lot of money there too. Right now, to take us to the next step, to take some of these hits that we have to make them even more potent and less toxic, some of them are toxic, we need to do miscible chemistry and reaction studies and we've put a plan together that will take another 40 million dollars. That's going to cover our research up until we enter into preclinical and clinical studies. We think that that's going to take one to three years until after we get the funding in order to enter preclinical and clinical studies.

Dave Asprey: Have you considered doing this completely outside of the U.S. to avoid all the clinical study regulatory stuff. Doing it in India where there's a billion people or like in China where you could do this in half the time?

Bill Andrews: Absolutely. We've considered it but we're not there yet. We're not at a point where we need to start doing clinical studies. I think we are going to wait and see how the FDA responds to our request to do clinical studies. They've been pretty negative in the past stating that aging is not a disease and that science should be focused on adding life to years not years to life. We're finding out that extending telomeres does both so hopefully by the time that we have something to take into clinical trials the FDA will be a little more enthusiastic about the thing and maybe help use accelerate this through the FDA process.

Dave Asprey: I love the way you put that. Undoubtedly, in my mind, the things that add life to your years are also the things that add years to your life. Trying to do only one of the two doesn't seem to work very well.

Bill Andrews: And who wants to live a long time if you're not living?

Dave Asprey: Exactly. Well, Bill, thank you so much for your time today. Can you tell the listeners where they can learn more about what you're doing, especially if there are listeners who have millions of dollars they want to invest?

Bill Andrews: We have two websites that are actually the same website. One is www.sierrasci.com. The same website can be gotten to by the easier to remember website name and that's www.cureagingordietrying.com. Because of our funding limitations right now, we

don't keep the website up to date 100 percent but still people can get contact information there and I also have an email address that I've created some months ago so when I give presentations or radio interviews if people have questions they can write to me specifically to ask me the questions. The email address is, appropriately, questionsforbill@yahoo.com, so anybody who has questions or advice or even wants to invest or knows of a potential investor, go ahead and email me.

Dave Asprey: We will put links to your address and you website in the show notes and we'll have a full transcript of this typed out within the next couple weeks which we will also post of the site so people can find it and can read it if they don't want to listen. We'll make sure people can get in touch with you and if people have questions about general life extending or performance enhancing we also answer some of those things on our site. We're certainly no experts in telomeres like you which is why we had you on the show.

Thanks again for sharing your knowledge and sharing the passion for the work you've done for many years to promote general wellness in people everywhere.

Bill Andrews: Thank you very much and I hope everyone is prepared that the planet is going to undergo a very big change very soon.

Dave Asprey: Thank you, Bill.

Listener Q&A

Dave Asprey: Now we'll start with the Upgraded Self Radio Listener Q&A.

Armi Legge: The first question comes from Tim Murphy. "Dave, I am a coffee snob and only like to drink black coffee, but I finally tried Bulletproof coffee and I can't believe it but I am hooked. I heard in one of the podcasts you said to use a paper filter to filter out the oils in the coffee. I don't remember why though. Many coffee snobs like myself use a French Press to make coffee which leaves the oils intact. Is there anything harmful in the oils?"

Dave Asprey: There is and I am also a coffee snob and for years I had espresso machines and I used a French Press pretty often. I switched to either the Aero Press or my favorite which is actually the pour over Hario V60 with the paper filter because there's an oil in coffee and it's actually correlated with much higher, 15 percent higher LDL cholesterol. I haven't seen research that says whether that's oxidized, dangerous, LDL cholesterol which would be indicated LPLA2 blood test for you biohackers out there or whether it's some other effect but there's decent evidence that paper filter to filter out the oils is probably going to be good for your health and that's why I decided to go ahead and do it and it sure makes good coffee.

Armi Legge: The next question comes from John. "I'm intrigued by your post on Modafinil. Too bad insurance won't cover it and it's so expensive to purchase out of pocket. Do you have any personal experiences with Adrafinil, the analogue to Modafinil? Also, do you have any personal experiences with male HRT or TRT hormone therapies? Your site is boss, keep it up! John."

Dave Asprey: Thanks John. Thanks for the comment on the site. It actually makes me motivated to keep writing, just keep doing this. I do this for fun for the most part. I have a day job. I'm a Vice-President at a large, really successful, internet security company so this is a labor of love.

Second of all, insurance will cover Modafinil if you say the right things to your doctor. There are three approved things that you can have that cause them to prescribe Modafinil. The first one is shift work or sleep disorder so if you go to your doctor's office and explain to your doctor that you fly on airplanes a lot and suffer from jetlag and it's a requirement for your job or that you have a shift based job even if it's just part time consulting that makes you stay up late at night and that you're suffering from shift work or sleep disorder for an approved, insurable use. The other one is ADHD and that one is an off label use but it's usually approved. You just need to get the right IBC9 code to argue with your insurance company and tell your doctor what to say and you probably can get Modafinil approved.

I don't believe that you would be wise to take Adrafinil because Adrafinil is a precursor, it was invented before Modafinil. It's much less popular because it significantly affected liver function. Modafinil can in some small parts of the liver detoxing have an impact but it's a very minor impact and I actually believe that Modafinil is about as safe as caffeine based on lots of experience using it and reading things about it, even reading the studies.

In terms of the question about male hormone replacement therapy, absolutely I have experience being a formerly obese guy who weighed 300 pounds when he was in his early twenties, I have a tendency to turn my testosterone into estrogen more quickly than I should meaning I basically had man boobs for lack of a better term. If you've seen the picture of my six-pack, you can tell I don't have them anymore. I use a very small amount of bio-identical testosterone cream every day. I monitor my blood levels of testosterone and they're actually lower than they would be if I had my own natural endogenous testosterone production where it should be. I highly recommend it especially for guys who are 40 or higher. If you pin your testosterone to where it was when you were 30 by using a bio-identical testosterone, that's very important, you will find that you really affect your aging, your cognitive function, your zest for life, and if you're over 50, you can actually get cranky old man syndrome which is actually acute lack of testosterone. I can tell you, my dad might get a little annoyed by this, when he and my mother say an anti-aging doctor friend that I referred them too, Dr. Miller in Los Gatos at antiaging.com. It turns out that my dad had more estrogen than my mom and I think that's kind of funny. They have since fixed that problem and I think that his mood has improved since then too and this is a very normal thing for men. It's something that affects your performance and your quality of life and it's just not worth

having low testosterone. I think maybe I spend $70 a month on this. It's one of my top three or four important things. Thyroid is more important than testosterone if you have a problem there.

Armi Legge: The next question comes from Robert Coleman. "Hi, I was wondering if there has been any research done in to using epigenetics or some other form of biohacking to get rid of lactose intolerance? I would really love to be able to eat ice cream again."

Dave Asprey: You know Robert, you're lucky. Lactose intolerance is such a minor problem that it's almost funny. Go out and buy the enzyme that digests lactose and take it whenever you want to eat ice cream. Of course, you'll deal with the casein problem in ice cream which is an inflammatory protein that's not very good for you and the sugar is a problem but over all if lactose is the only problem you have and it's not a casein-sensitivity, it's solvable with just a little capsule. I've lots of friends who've said they can't eat ice cream because they get these horrible pains. It's actually just a matter of taking lactase which is the name of the enzyme. You can buy it at any vitamin store. Problem solved.

One more thing. Epigenetics is awesome but remember that the idea of epigenetics is that genetics are past down to generation to generation is going to be tough unless you can go back in time but you can also use environmental things that change your genes to probably make yourself less sensitive to lactose but I don't know if you can turn on the gene that allows to you digest lactose. There's been evidence that some bacteria manufacture genes that didn't exist before in order to be able to digest lactose but I've never seen it in a human being. If you figure that out, let me know.

Armi Legge: The next question is from Chuck. "Hey guys! Awesome podcasts so far. They are really good stuff. I have two questions that are totally unrelated. First, you talk a lot about intermittent fasting and incorporating exercise with it or not. But what is a minimal fast period? I usually see at least 12 hours, but sometimes I'll have breakfast at say 9 am, then not eat until 7 or so at night. Is this at all effective or is it pointless since the time span isn't long enough?" Let's first cover this question before we move on to the second one.

Dave Asprey: Here's the deal. There's intermittent fasting, there's a lot written about it on the internet and they generally will tell you to fast between 8 pm and 2 pm so basically you don't eat after dinner and you have a late lunch. What I prefer is bulletproof fasting which involves pretty much the same thing but while you're fasting, when you wake up in the morning you have a cup of bulletproof coffee that has nothing but fat in it particularly MCT oil the high caprylic form I recommend on the site as well as grass fed butter. When you do that, you keep all the benefits of fasting but you don't feel hungry and you don't get tired like you do when you fast so you get the sailor regeneration but you get this awesome mental performance and you tell your body "It's time to burn fat, buddy. You've got nothing else to burn here." So it keeps your body from burning some muscle there. You feel awesome when you do this and it's my favorite breakfast – just that bulletproof coffee. It is just amazing.

Minimal fast period, it depends on you. It depends on how often you do this, how quickly you can put your body into ketosis. I don't know exactly if I have a minimal one but you usually tell because something happens to your energy or sometimes the way the taste in your mouth is and it makes that change and I can't describe it very well but it's different then it was before. It's not that you get bad breath unless you get lots of toxins in your body but that's how you can tell that you sort of hit that minimum period and now your body is burning fat and different biological processes have kicked off. It's probably somewhere around 10 hours but I think you're going to do best with about 12 hours.

Armi Legge: That's exactly what I recommend to most of the clients I have who I am using intermittent fasting with, is it usually takes at least 12 hours to consider it fasting. Otherwise it's just skipping meals. That's not really what I would call full fasting. In terms of the having breakfast and not eating all day, I don't usually recommend snacking and it can be beneficial to space out your meals but you're not going to be getting the same benefits as intermittent fasting by just stretching out your meals like that. It really does have to be longer.

Dave Asprey: That's a fair point, Armi. I kind of missed that in the question but having breakfast and just skipping lunch, that's not fasting. You're totally right.

Armi Legge: The other thing is bulletproof fasting is perfect if you're trying to maintain your performance like you're an entrepreneur or something but if you're one of those people who's kind of crazy and trying to get down to 4 or 5 percent body fat, it's generally just better to go with the full fasting. You probably won't maintain your cognitive performance as much and it depends on the person too. It's a very individual thing but generally if you're trying to get super cut kind of super physiological levels, it's best to go with the full fast.

As far as incorporating that into an exercise program that's going to depend on all sorts of different factors such as your sleep quality, your diet, your training, your metabolic flexibility – whether you're able to burn sugar or burn fat – and all sorts of other variables. So really I can't give you much help in terms of incorporating that. That is something I work with clients and it has to be done on an individual basis. If you're interested, you can always contact me, Chuck.

His next question is about the omega-3 fats "especially in those in foods like salmon. As you know, salmon is full of healthy omega-3s, but what about the difference between wild and farmed salmon? I know wild has more omega-3s, but is farmed salmon bad for us or just not as good? Same for beef; if one couldn't get grass-fed, is grain fed bad for us, or are there still some redeeming qualities? I'm more interested in the salmon. Thanks guys!"

Dave Asprey: Here's the deal, farmed salmon depending on what it was feed, is certainly not as good for you as wild salmon and sometimes it's bad for you. The stuff that they put in salmon feed is usually cooked, dried up fish like they pick whatever fish they can get like sardines or

whatever bait fish are available, they grind them up to make fish meal, they add soybeans, they add wheat, they add antibiotics, and often times there are heavy amounts of pollution like heavy metals including pesticides that came from cheap sources of food and basically stuff that fish shouldn't eat. If that's the kind of farm salmon you got, it's actively bad for you because it's full of toxins. So, on a kind of comparison basis I would always choose farmed salmon before I would eat farmed chicken because salmon actually has let toxins than your average chicken that you are going to be able to find. Even organic chicken isn't that good for you. Farmed salmon is a good "I'm at a restaurant. They don't have any wild fish. I'll pick farmed salmon." That's probably the lowest toxin choice but the fats aren't going to be very good for you. You're not going to get very much omega-3 in it.

With beef though it gets even worse. The problem with toxins in beef is higher because there's a lot of mycotoxin and estrogenic things that get used in cows including extremely strong synthetic estrogens that they put in a waxy tablet in the cow's ear that then melts into their body, absorbs through the high blood circulation in the ear and causes the body of the cow to be striated with fat that gives you that nice marble. If you eat that fat that has that hormone in it, your body will look like that nice marble fat in that beef you ate. You do not want to do that to yourself and you actually don't want to do it to a cow either. Grain fed cows, even if they are organic, are not going to have that pesticide but the organic corn, soy, and wheat that they feed the cows is still not natural cow food. If you have to eat beef that is not grass fed, you need to eat fillet mignon or an extremely lean cut. Avoid fat from grain feed cows, even 30-day grass finished cows. Same thing. You don't really want to eat that and you will get protein from the beef but it's really important to get the beef fat. It has an enormous amount of nutrients in it and fillet mignon sautéed in grass fed butter is going to be better than a nice fatty cut of rib eye that's not grass fed.

Armi Legge: Yeah, my general recommendation for that is that if you cannot find grass fed meat, get the leanest cut and take a little more omega-3 supplementation from fish oil. Just make sure it's a good kind of fish oil. I think this is one of those instances where you just have to accept you are not in an optimal position and then move on from there. So, no, you are not going to be as healthy eating grain feet meat. Are you still going to be far healthier eating that than become a bagel-tarian or a vegetarian? Yes, so just understand that while it's not optimal it's still okay but you just have to accept that too at some point.

The next question is from Bill. "I'm wondering if you have any insights into how an adult such as myself, age 35, could do some biohacking to trigger body growth. I'm 5'4″ and am fascinated by biohacking in general. I've been eating Brazil nuts and taking vitamin D3 to boost testosterone. I haven't done blood tests, but anecdotal results seem to indicate that I'm making progress. Anyway, if I could trigger body growth, I just think that would be pretty kickass. Thanks in advance for anything you're got."

Dave Asprey: Well there's sort of two answers about body growth. I'm hoping you mean muscle growth not height but you mentioned you're 5'4" and you want more height. There's always the surgery to increase your shin bones which is incredibly destructive and you shouldn't do that. That's barbaric to be honest, but I've seen some evidence that people can increase the

amount of spacing in their spine by stretching and maybe taking some collagen supplements and generally improving their posture so you can probably find about an inch in most people. In fact, when you wake up in the morning, if you take you height, you can be about an inch taller than you are at the end of the day just from compression in your spine. So training yourself to stand up straighter and to have better collagen to form in your body which can take several months, I think you might find some significant benefits there.

The best way I know to improve collagen is you need to be exercising and things like that but you also should try the collagen stuff we have on the website. It's hydrolyzed type 2 predigested collagen so it absorbs into the body and it's designed to improve joints and basically those things between your vertebrae are joints.

The other thing, if you're talking about muscle growth or you just want muscles to support your spine, taking a whey protein concentrate with very high levels of IGG is a good idea. I've been working for years on finding one that doesn't cause stomach upset and one that has unusual muscle building capabilities and I finally got the formula down where I want it and we're actually going to be launching something called Upgraded Whey some time on our sister site upgradedself.com.

Armi, do you have any other thoughts on getting taller?

Armi Legge: Not really. Unfortunately that's more genetic, the kind of 5 percent that are pretty much set in stone. There are obviously things you could do that could hurt that like staying stressed all the time, lack of sleep when you're young, so I don't have many great ideas in terms of increasing your height once you stop growing. I'm kind of confused why you're taking Brazil nuts to boost testosterone. I know Brazil nuts have selenium but they also have extremely high amount of omega-6, about 1 gram per Brazil nut, so it's probably not a very good idea to be eating those and I have never heard any research showing those boost testosterone. What do you think about that?

Dave Asprey: Tim Ferriss writes about that and frankly eating a Brazil nut to get selenium is kind of a bizarre thing because let's face it, the amount of selenium in your Brazil nut comes from where the tree was grown and Brazil nut trees have really deep roots and they're probably getting some selenium but your nut may have much less than the one they tested a while back from some other tree so if you're eating a food to get a specific nutrient, why don't you take the most absorbable form of the nutrient that going to make sure you get what you need and then you'll get a little extra from your food if it's actually there. The form of selenium that would be most beneficial is selenomethionine which is a methylated form of selenium which your body can absorb best. You want to actually avoid sodium selenate which is a kind of toxic form of it which you will find in some high end vitamins. Selenium is good for you. A lot of people are deficient but Brazil nuts usually have it. The question is what dose, I don't know.

Armi Legge: I think that's one of those things you have to understand is not going to boost your testosterone eating Brazil nuts. I've never heard of that. It might increase your testosterone a little bit by just having adequate selenium levels but again eating Brazil nuts is not the best way to accomplish that. Might not be the best idea.

Dave Asprey: No. I agree with you. That's a Tim Ferriss thing. He did that in his book and a lot of people are doing the Brazil nut thing. They're pretty high in unhealthy fats. One of them is not going to hurt you. Eat a whole bunch of them, who knows if it was moldy or not. I find there's a lot of mycotoxin problems with Brazil nuts. They're not very high on my list.

Armi Legge: Agreed. The next question is from Chris. "I really enjoyed your Q&A talk. You had mentioned biohacking to improve your vision. I believe it was from 20/50 to 20/20? I have recently at the age of 43 gotten my first pair of reading glasses. And I've been a very heavy reader, I just find these just not acceptable to wear every day. They cause me blurry vision and headaches and nausea. I would rather put the time and effort into hacking to correct my vision. But I couldn't find anything on your site about hacking vision. Can you help?"

Dave Asprey: I can help and it's my fault I haven't had time to write this stuff. I do talk about it though. There are a few comments that I've provided answers to questions but I owe all of the readers a blog post on that because I've talk about that in my presentations.

One of the first books to read is called Yoga for Your Eyes by Meir Schneider, we'll link to that in the show notes so that you can spell his name write. Meir came and spoke at the anti-aging group that I run called Silicon Valley Health Institute. Meir is an amazing guy. He had cataract surgery when he was two and his eyes are basically like shattered mirrors, when he looks through them he isn't supposed to see anything, and through just force of will and years of training he taught himself to read and actually has a driver's license. He runs a clinic in San Francisco where he teaches people to use body awareness and to reprogram the signal that comes from the eyes going into their brain. If you read his book it's a really inspiring story of a biohacker. This guy rewired his entire body in a way that's phenomenal. He's got to be 50-60 years old, maybe even more and he can do this with his body to this day that other people can't.

The link between body awareness and vision is very strong but you should also look at a developmental ophthalmologist and what those guys do, and I've don't extensive work with one because things happen in your body in the first year of life with the way you crawl, learn to walk. I was duck-footed as a child and I still have flat feet probably as a result of that. They can detect things by the way you move that indicate how your vision centers are working with your body. I have done some really strange exercises like learning how to uncross my eyes going out versus in, learning how to relax my eyes, and things like that. You'll find the basics in Yoga for Your Eyes and if not, post more questions on the website in the comments field in any of the blog posts or show notes and I'll get back with a few more links for you. Overall, starting with those two links – reading the book, doing those exercises – and then doing the things that any developmental ophthalmologist would recommend for you will be phenomenal. It took me three

months to take my vision from 20/60 back to 20/15 and I got rid of a stigmatism. The amount of time I spent training was about one hour every Saturday morning during those three months and I maybe did ten minutes a day of exercises a few days a week. It was not a huge time investment and it avoided the need for glasses.

What I highly do not recommend, even though I had it done in 1997, is getting LASIK – the eye surgery. LASIK did bring me to 20/15 in both eyes but I think my night vision is still substantially reduced. Knowing what I know now, there's no need for that surgery for the vast majority of people unless they have very strange things going on. You can train your eyes just like you can train you bicep.

Armi Legge: The next question and the last one is from Ron. "Hey David, I've been eating almost a stick of Wild Harvest Organic Butter for the past few days and sometimes I feel a little discomfort in my chest and heart area. I would appreciate any thoughts or comments you can provide about this problem. Thanks."

Dave Asprey: Well, first thing, if you're having chest pain it's always a good idea to see your doctor. There's no doubt about that.

The other question is organic butter, is that grass fed or is it organic? Because if I wanted to sell the cheapest organic butter, I could. Here's what I'd do. I'd buy an organic cow, I'd put it in a feedlot and then I would feed it organic soybeans, organic corn, and maybe some organic hay. Now buying the cheapest organic soybeans, corn, and hay I could find which would be the moldy stuff because people want to pay less for moldy things and then I'd throw a few binders in hopefully the cows would still produce enough milk and if I got just enough toxins but not too little to be expensive, not too many to kill the cows then I would have the cheapest organic butter that would absolutely not be that good for you. Fortunately, butter doesn't have as much toxins as cheese or milk in it but it still has some which would not be good for you. I think you might have a problem in that your butter really isn't grass fed, it's just organic. Organic soy, organic corn do not make great butter. I would eat soy and corn fed butter if it was all I could get versus no butter whatsoever but I don't know if I would want to be doing a whole stick of it every day.

I don't believe that a stick of it should cause discomfort in your chest and heart though. That could also be a detoxing reaction. I don't know about your exercise levels, your thyroid levels, and all but if it feels like real discomfort, seriously, go get a heart scan, get your blood lipids done. That's really important and don't forget to add coconut oil. You can bring some MCT oil which is particularly good for cardiac function because it feeds your mitochondria directly. I would mix that with the butter, that's what I do in my coffee in the morning.

Armi Legge: Another thing just to think about is, I'm not saying that Ron is making this up at all, but sometimes people when they've been conditioned for so long to believe that saturated fat gives you heart disease, the second they start eating something like coconut oil or a lot of animal fat, they kind of have the subconscious feeling like their heart should hurt and that translates to

an actual physical feeling. I know that sounds kind of new-agey, but it happens and people do convince themselves that these foods cause heart disease and then they feel like they're going to have a heart attack. So I don't know if that has any influence on Ron but I'm just pointing out that is one other possibility.

Dave Asprey: That's a really good point. In fact, your heart is so tied to your emotions that I actually found as I was going through some of the personal growth things I've done and learning to feel that emotions that I feel happen in different parts of my body. You have a gut feeling or a heart ache. Those words come from actual feelings that happen in the body so you can actually feel apprehension, fear, and stress in your gut and you can feel love and connections or even stress or you can hate someone with all your heart. All of those are actual physical feelings in the body that you're capable of learn and better yet we can measure using sensitive measuring tools. This isn't all in your mind. It's actually all in your body and interpreted by your mind so this is a body mind connection so exactly what Armi said, if you're feeling apprehensive about the butter, that apprehension may reflect itself in your heart.

I recommend to everyone who is listening to this to try the emWave HeartMath device that teaches you to have very good feeling of in control of your heart rate because in about a month of training for 20 minute a day and occasional ongoing practice, you can change your whole body stress response so if you have that heart level awareness you may find you can control what's going on in your heart or chest but in the meantime I think you ought to check with a doctor and you want to make sure that you're getting Irish butter, KerryGold, or New Zealand butter from Anchor.

Armi Legge: That is a very good point. That's going to wrap it up for our listener Q&A. If you have a question for the podcast you can contact us on Twitter, @bulletproofexec. You can find us through the Bulletproof Exec Facebook fanpage or you can leave a comment to the show notes of this show or one of the other articles on our site. The show notes will be displayed on Bulletproof Exec along with links to everything we talked about today.

Biohacker Report

Dave Asprey: Welcome to the biohacker report. This is the part of the show where we bring you some of the latest research that caught our attention. The first piece of research comes from the Journal of Neuroscience and it was conducted by a team from Inserm in France. For this study, neurobiologists looked at why our neurons remain silent so our performance can improve. It turns out that we have two complex networks in our brains. One is called the default mode network and that rules what you're doing when you're doing nothing and it makes up the thoughts that run in your head, your imagination, you creativity and things like that. The discoverer of the default mode actually calls it the brain's dark energy and it's sort of a mystical part of the brain that's not really fully understood. And then there's the brains attention network and that's the part of the brain that you use when you're paying attention to things around you like trying to find an object. In order to be able to focus on the world, you need to turn off your

default mode but we don't really know why we sometimes turn off our attention neurons when we need to think the most. Think about stage fright. You need to pay attention to what you're saying and you can't. This research shows that the default mode network always works even when you're doing nothing or when you're doing something and how completely you're able to turn off your default mode network determines how quickly you can find something around you. After you find what you're looking for, you resume the default mode unless you're looking for something else.

The write up about this research talks about how important it is to completely turn off the default mode so you can pay attention better but the biohacker in me is actually laughing at that because the research also shows that you have the ability to pay attention and access the default mode network at the same time. That would give you the ability to be creative, use your intuition, and pay attention at the same time. It turns out that one of the brain training exercises I've done in my own biohacking while I was connected to an EEG is shown to increase creativity by 50 percent on standardized scales but it turns out you don't need an EEG to train your brain to pay attention and be doing what it naturally does. I've got the team here working with a Ph.D brain scientist in Europe to create some brain training software that will teach your brain to be in default mode while you continue to pay attention. That's a bulletproof skill. Access your creativity, your intuition, and still get stuff done.

This ground breaking research leads to the conclusion that a well trained mind can and will be able to finally control how much default mode versus attention mode it uses at once and that if you can move more quickly between those two extremes, you'll do better. It's also a little mystical because if you spend all your time paying attention, what happens to your default mode network where you creativity comes from? I think we know the answer. It gets weaker like other parts of the brain that don't get used enough and that's why I think mediation or breathing or maybe exercises with the emWave help you to feel more creativity as you go about your day. It's because they teach you how to let your brain do it's natural things – it's default mode – by paying attention less to the world around you and more to what you're feeling as you train or meditate.

The next piece of research was also pretty interesting. It validates something else I talk about in the blog. It's titled "Exposure to Mobile Phones Before and After Birth Linked to Kids' Behavioral Problems". This is a massive study of about 100,000 women over six years in Denmark and it was published in the Journal of Epidemiology and Community Health. They found that when they measured seven year olds, those whose mothers used cell phones the most had very substantial behavior issues and much more likely than kids whose parents did not use cell phones. This is another piece of evidence that shows mobile phones are doing something to our biology and there are various discussions of what they are. I'm not saying don't use a mobile phone. I'm sitting with a mobile phone right in front of me, but it's not in my pocket. It's sitting a few feet away from me. Minimizing exposure probably will lead to better performance or living longer over long periods of time and it doesn't cost you very much to set your phone down on the dashboard or on the chair next to you instead of putting it in your pocket all the time. That's what I'm recommending right now as well as not holding it up to your head while you talk.

Finally, the omega-3 fatty acids part of the biohacking report. Some new research has come out that shows that omega-3 oil from fish can substantially and significantly reduce the signs and symptoms of osteoarthritis. If you don't want to get arthritis it turns out that eating a little bit of omega-3 just might be a good idea. In fact, eating more than a little might be a good idea as long as you're not being excessive there. The researchers who are from the University of Bristol and were funded by the Arthritis Research UK Institute published the research in the Osteoarthritis and Cartilage magazine, which is great reading. They tested it on guineas pigs, who naturally get osteoarthritis. They found a 50 percent reduction compared to a standard diet but more importantly these researchers said fish oil was far more effective than flax oil. I recommend in the bulletproof diet that you actually don't use flax oil. The reason is fish oil, or better yet, krill oil is far more effective and flax oil is very subject to oxidizing both in the body and in the world because it's very highly unsaturated which means as soon as heat, light, or air hit the oil, it starts to oxidize and oxidized oils are inflammatory. That said, if you are a vegetarian who hasn't yet decided that you want to be bulletproof and you want to be all you can be, you can take some flax seed oil and it might help you. I don't recommend it though.

Conclusion

Dave Asprey: As a reminder, you can find links to everything we talked about in the show notes at bulletproofexec.com. It usually takes one to two weeks for us to get the transcription of the notes up but the transcription is searchable and it's available for free to everyone.

If you enjoyed this and found it valuable, I'd really appreciate it if you could help us by leaving a positive ranking on iTunes so other people can find the show and we're always so thankful when people leave comments on the blog. We answer the comments and they become part of the knowledge of anyone who's interested in improving their performance and feeling better and not pretending that they're in a famine in order to stay thin or stay healthy. You can feel like you're in a world of abundance which makes you stay strong and high performance and that's what we're all about.

Armi, thanks again. Take care and I'll see you soon.

Armi Legge: Later, Dave.