



## **Transcript of “Extreme Endurance Training and Ketosis with Ben Greenfield”**

Bulletproof Radio podcast #102



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Dave: This is Dave Asprey with Bulletproof Executive Radio. Today's cool factor of the day is that doctors are now being trained to fist bump their patients instead of shaking hands, that's because there was a study on the transmission of MRSA, flesh-eating bacteria and show that when you do a fist bump versus a handshake, there's less risk of contagion. With that said, I think they're all a bunch of worry words, but that's just me.

Today's guest is one of the leading personal trainers in the country. It's Ben Greenfield who runs Human Wellness Solutions, and is one of the top rank fitness podcast in iTunes. In fact, he isn't that, he runs it and he's called the Get-Fit Guy. Also, the author, Ben, of Beyond Training: Mastering Endurance, Health, & Like, welcome to the show.

Ben: Thanks for having me on, Dave.

Dave: We've interacted quite a few times in the past, Ben. You're at the biohacking conference that I put on with Bulletproof, and I spoke at your conference.

Ben: Yes, painful memories of the getting the hell shocked out of my abs for 10 minutes with that thing.

Dave: I was like, "We're going to make him cry."

Ben: I literally felt like I did a thousand sit-ups the day after that.

Dave: Yeah, I think everyone felt kind of worked over but that was the point, right?

Ben: Yeah.

Dave: All right, now, I've heard through the grapevine that your favorite superhero is Peter Parker. Why? Why Peter Parker? I have to know.

Ben: I've no clue who told you that because I don't remember ever having said that.

Dave: I have an army of spies that help me do research on the guys I'm talking to.

Ben: I do wear spandex quite frequently so that might be one of the reasons. I'm just kidding. I sleep in a Spidey bed, so.

Dave: You, too? One of the reasons I wanted to have you on is, you are a Bulletproof Ambassador in some of the things that you're doing like your Ironman training. You just finished a massive Ironman in a state of ketosis. I totally want to hear about how you did, how it worked out for you, and things like that. This is kind of pushing the boundaries of ketosis, pushing the boundaries of what the human body in that state. What did you do?

Ben: Actually, I'm flying over to University of Connecticut on Wednesday to Dr. Jeff Volek's laboratory. They're actually going to test a bunch of athletes who have been eating a high-fat diet or keeping themselves in the state of ketosis for at least six months. They're going to test whether you oxidize more fat during exercise. They're going to have us run for three hours on a treadmill, which I'm not looking forward to.

Dave: That sounds like hell to me.

Ben: I can last about 20 minutes, then I'm ready to blow my brains out. I've never ran three hours on a treadmill, so we'll see how that goes. I'm hoping they have a really good satellite TV in there. They'll be doing muscle biopsies to look at rate of muscle glycogen depletion in folks who are "fat adapted versus carb adapted." They'll be doing carbon dioxide measurements, blood lactates, all sorts of things to check out what happens to fuel efficiency, economy, energy storage, that type of thing when you're eating a high-fat diet.

What I did though earlier this year over the course of the summer in 2013, was I just tested myself as a case study to see what would happen on both the blood and biomarker standpoint, but also from a performance standpoint when you go into a state of ketosis which for me involved about 80-90% fat based intake to get myself up to the level of blood ketones necessary to be in that state.

Dave: What was your target blood number for ketones?

Ben: I started using the Metron breath tubes which will flag positive when you're at about 1.0 millimolar. Earlier when I first started, I was blood testing and most of the workouts, I'd finish up around 3.0 or 4.0 millimolars. Based on the way that I felt after doing the blood testing and what I saw from the breath testing, it was anywhere from about 1.0 up to, I'm guessing it may have gotten at the highest, like a long-fasted ride, maybe 7.0.

Anyways though I trained in the state of ketosis and I raced in the state of ketosis for Ironman Canada which is a really tough race up in your neck of the woods, Whistler. It's a new Ironman up there, brutal race with a 5,000 plus feet of climbing and race that. I actually qualified for Ironman World Championships, and then went on and raced Ironman Hawaii which is the one you'd see on TV, out in the lava fields, and did the same there, and also raced successfully. I came in under 10 hours, and did the same thing, used ketosis for that.

What I was able to find out was kind of how the body felt, what happened to my own blood and biomarkers during pretty excessive training or a very high amount of training, and then a high-fat diet.

Dave: I would predict that anyone who's doing that level of training is going to have some pretty ugly inflammation. That's what I've seen with other coaching clients who've come in after just doing lots and lots, and lots of cardio that they tend to look good but they can have homocysteine, C-reactive protein, LPP-PLA2 are high. What was your inflammation like after you did this?

Ben: Surprisingly, and I look at a lot of blood panels. I do some consulting for WellnessFX, so they send me a lot of their cross fitters and extreme athletes. A lot of them do have elevated hs-CRP. That's kind of a go-to inflammatory marker that they measure on the performance panel over there. Surprisingly, my hs-CRP was rock bottom, and perhaps that's because I was taking in fewer amounts of oxidizable carbohydrates. It was 0.2, 0.3. The highest I ever saw it was 4.0, and that was the day after

doing back-to-back triathlons on the hardest triathlon in the United States that's in California.

Dave: I think that's a very good number.

Ben: Even that, I mean, it wasn't through the roof but I like to keep it below 1.0. I tested after my Ironman events several times during over the course of the summer, and that was one number that stayed pretty rock bottom. Inflammation was not an issue. There are some other issues we can talk about that I think ketosis created just because I was experimenting and trying to figure out how to do things the right way, but inflammation wasn't issue.

Dave: What else happened with ketosis?

Ben: From a blood standpoint, one of the things I noticed was I started to get cold, like, I use cold thermogenesis. I never even touched the hot water tap on my shower. I use a cool fat burner vest. I keep my home cold. But I started to get very cold over the course of the summer which is kind of weird, because the weather stays relatively warm here in Spokane.

Energy level started to dip in the afternoon, and my TSH if you look at the ... I've got a blog post somewhere, Ben Greenfield Fitness where I showed the rise in TSH, but you can just watch TSH going up over the course of the summer.

Dave: For the people listening, TSH is thyroid-stimulating hormone, so this means that his body was asking for more thyroids.

Ben: Exactly. I either was not producing enough thyroid or I wasn't getting a good enough conversion of my inactive thyroid hormone to active which kind of makes sense because when you have elevated levels of blood fatty acids, it can inhibit some thyroid activity. Also, the conversion of inactive to active thyroid hormone relies upon a certain amount of carbohydrates. I suspect that I got my carbohydrate levels too low, and that I also was not eating or not giving my body enough hormonal support for my diet.

What I ended up doing was I started to eat a lot of liver, sweet breads. There are sweet breads from U.S. Wellness Meats. I started doing desiccated thyroid from a New Zealand cow. I used something called Thyro-Gold, and that fixed the issues. Within a couple of weeks, I wasn't getting cold anymore. I get that in between Ironman Canada and Ironman Hawaii. Retested TSH was fine. I was out like, 1.3, 1.4. I like to see levels between anywhere from 0.5 to 2.0 for TSH. That fixed that.

Testosterone also dipped over the summer. That ones I got on organ meats, and started doing those once a week. I'd take liver every week, and drench it in eggs and coconut flour, and fry it up in butter. That fixed the testosterone and the libido issues. There were some things that stemmed from ketosis that I was able to eventually manage with dietary adjustments but that turned out to show that you got to be damn careful combining very low carbohydrate intake with excessive levels of physical activity.

Dave: I found that most people on the [volumetric 00:09:39] diet, when they went ... especially women but even for men, if they went into ketosis and stayed there for long periods of time, including myself, lots of problems happened. But then dipping out and going back in seemed to solve those problems. Why didn't you just eat a bunch of rice and then go right back into ketosis just like let your body get a break?

Ben: I've done cyclical carb, I've done cyclical ketosis before and been successful with that. But for me, I just wanted to see what would happen. [Crosstalk 00:10:06].

Dave: [Crosstalk 00:10:06]

Ben: The total was N=1. It was just strict ketosis, and the performance payoff was good. Ironman Canada, I got stronger and stronger as that day went on. I was one of the top amateur guys off of the bike, had one of the fastest bike splits on the day on an incredibly difficult course, came in as one of the top finishers. I had a great race in Hawaii. Same thing, I got stronger and stronger as the day went on.

There were some definite improvements in most likely fat burning efficiency. I never actually got in and did a VO2 max test to look at improvements in economy and in oxygen utilization in a laboratory test, but Dr. Peter Attia has done some testing on VO2 max efficiency and economy in Dominic D'Agostino's laboratory. He's done with ketosis and also the intake of liquid ketones and seen some pretty good improvements in economy and efficiency on the bike.

I suspect I was probably experiencing some of the same things during Ironman. But yeah, the whole cyclic thing, I just wanted to see what would happen if you avoided that completely and just went full on ketosis for 16 weeks.

Dave: It's interesting even without the, well, this term chronic cardio for a lack of better word, although, man, hats off for your performance in Ironman. I'm impressed.

Ben: I should in there by the way, I train 8 to 12 hours a week. I certainly train more than a lot of folks but I do limit my chronic cardio, and I use a lot of the techniques I picked up at your Bulletproof Biohacking Conference last year from Jay Schroeder in terms of building up lactic acid, and we can talk about some of the ways that I did that, but yeah, [crosstalk 00:11:53].

Dave: That makes sense. That's probably a part of why you're resilient in this case. In my own experiment, I did about 90 days. I was going to go for like six months where I ate a serving of green vegetables every day. Everything else was fat, like tons of fat. Bulletproof Coffee all the time, meat, and some organ meat, probably not enough. I was trying to replicate an Eskimo ratio where it's like super high fat, similar to what you're doing, 80-90% fat.

What I found was similar to you, after about 60 days, my sleep quality started to decline. I would wake up feeling tired, and it would show on my Zeo that it was like nine wakeups every night. I wasn't aware of these wakeups but it was like deep sleep was just not happening at all. Then, there were libido issues. I started getting weird headaches, and I got really dry eyes. Did you get dry eyes during this time?



- Ben: I didn't get dry eyes, and I know that lack of glycoprotein formation in your joints and lack of mucin production are two byproducts of extremely low carbohydrate intake.
- Dave: Yeah, it was the mucin thing that was getting me.
- Ben: Yup, exactly. But you got to remember, too I'm eating 4,000 to 5,000 calories a day, so even on a very low carbohydrate diet, I'm typically getting more than 50 grams of carbohydrates.
- Dave: This was honestly my mistake because I was also eating around 4,000 to 4,5000 calories a day during that time. I did that for two years straight. I'm like, "Look, I grew a six-pack on 4,000 calories a day." The lack of mucin is a real problem because what it did was you need mucus to line your gut. When you go very low carbohydrate like that, and I just did not have enough raw materials to make mucus lining to protect my stomach. I got a leaky gut.
- I developed some allergies that I'm still working on, like an egg allergy. Like, what the hell? How do you live without eggs? It's terrible. I get some ice cream, it looks me every night. I'm like, "I'm not going to eat that right now." I'm working on reversing an egg allergy that came about from that.
- Ben: It's kind of interesting that you bring up the Eskimos because [inaudible 00:14:11] Chris Masterjohn who wrote about the Inuit population, and how they found that to maintain fertility, they have to go out of their way to eat organ meats, and do things like the liver and the sweet breads. I think they were doing moose thyroid, and things like that just to be able to maintain adequate hormonal status while on a very low carbohydrate diet. I think it's cholesterol-and-health.com or something like that is his blog, but he's got some interesting stuff about that over there.
- Dave: Chris' work is amazing. He's been on Bulletproof Executive Radio, and we talk about those kind of stuff, and I think he's been on your show, too.

Ben: Not yet. I'm got to get him on the ...

Dave: He's just an amazing, amazing researcher and has the ancestral thing down. When I think about the Paleo masters, he's on the list. What's his name? Master John, but he's a cut above. I really admire him.

This is one the risks of extreme ketosis. What I found with women, is they first talk about lack of just life energy, and then dreams go away like they stop efficient dreaming which is why, I'm like, "Okay, do the cyclical thing." I'm not certain that same ketosis all of the time forever is a good idea. I'm sure that spiking your ketones is really good, and it maybe that the path you're on, is totally the right one like that's what we want to be doing. I just don't know for sure, [crosstalk 00:15:47] important.

Ben: I have since adjusted my diet since Ironman Hawaii. I'm down to more like 60% fat intake now, 50-60% fat, 20-30% protein, anywhere from 10 up to 30% carbohydrate depending on the volume of any given exercise day. I find that, you know, it's not only a way more sustainable if you happen to walk into an Italian restaurant but it's just a little less stressful on the body. I don't go out of my way quite so much to eat organ meats.

The other thing that I track, I think similar to you is my heart rate variability and my nervous system stays way more stabilized with this approach. I'm not doing full on ketosis anymore. I'm still doing things like, you know, for example, the Bulletproof Protocol prior to my big training days, prior to my races.

Dave: Do you do Bulletproof Coffee before the race?

Ben: What I used to do before the race was I do a huge bowl of oatmeal, and a lot of times I would do that. If a race start was at seven, I'd do that around 3 or 4am. Then, I do sweet potatoes, yams, nut butter, usually some cinnamon and some sea salt, a little bit of honey on that, and that would be about two hours prior to the event. I would just jack up blood glucose, elevate muscle and liver glycogen storage as much as possible, and go into the race in that state.

For Ironman Hawaii and Ironman Canada, two of my fastest Ironman, what I did was I woke up about two hours before the race, and then did coffee, butter, amino acids, MCT Oil, and I kept ...

Dave: This was all the stuff I was sending you, right, the Upgraded MCT or [crosstalk 00:17:28]. Is that Upgraded MCT? All right, cook.

Ben: Exactly, exactly. At that time, it was still Upgraded MCT, and kept the Upgraded MCT up during the entire race at the equivalent of about a tablespoon per hour.

Dave: Wow.

Ben: What I found through my experimentation was that to stay in a state of ketosis during exercise, three things that work really well in addition to starting off this session with something like the Bulletproof Coffee Blend is using the MCT Oil and dosing with that every hour or during. Adding in amino acids ...

Dave: Which ones? [Crosstalk 00:18:01]

Ben: What I use was Master Amino Pattern. It's like an essential amino acid blend.

Dave: I use it, too. You probably got that from, what, Minkoff or someone?

Ben: Yup, exactly.

Dave: He also gave it to me.

Ben: From Dr. Minkoff who's at the Superhuman conference.

Dave: He's awesome when I visited him, and he put me on MAP as well.

Ben: Yeah, it's good stuff. But what I actually added into that was even more branched-chain amino acid. I was doing 10 grams an hour of MAP, and I think I came up to five of branched-chain in Ironman Hawaii, and that based on Peter Attia's recommendation. When I got towards the end of Ironman Canada, in about the last 8 miles or so, I did bonk. Part of it was

my amino acids dropped so low because I wasn't taking enough. We added more branched-chain amino acid. I think it was BioSteel was the name of the stuff that we used for that.

MCT Oil, amino acids at a relatively high dose, like 10 to 15 grams per hour, and then a slow release starch that kept the body from spiking blood glucose.

Dave: [Crosstalk 00:19:06]

Ben: Exactly.

Dave: That's great stuff.

Ben: You can super starch like a non-GMO cornstarch. They put through 40 different treatments to actually make it digestible and to increase the molecular weights. It's very, very slowly absorbed. You only take in about a quarter of as many carbohydrates you'd normally take in if you're going in a traditional endurance athlete or whatever is recommended by Gatorade. They recommend you to take in anywhere from 250 to 400 calories of carbohydrate per hour.

With something like UCAN, plus MCT Oil, plus amino acids; you do about 100 calories or so, about a serving of UCAN per hour mixed with the amino acids and the oil. What I would do was I would put all that in a blender, I blend it up, and then dump it into water bottles for the bike and then dump it into flasks for the run. It was really clean burning fuel that allowed to stay in ketosis while I was out there.

Dave: Beautiful. That's pretty impressive. That's a great protocol. Did you do anything like B12 or magnesium malate, or anything like that?

Ben: No. Why would I have done that?

Dave: Well, I've done some formulas for people running marathons, and especially post mile 20. I've used large doses of L-Glutamine which ... was that in your sack or no?

Ben: No.

- Dave: That plus sea salt, you know, all the amazing things, I'm sure you're taking some salt along the way.
- Ben: Not a lot. But sea salt pretty liberally in the days leading up to the event but salt intake drives kidney sodium excretion during the event so I was careful not to overload with the stereotypical amounts of sodium or electrolytes during the actual event.
- Dave: That makes good sense. I was finding, and these are not pro-athletes. These are the "I'm going to run a marathon," kind of people, maybe for the first or second time. A couple of pinches of salt really had a rejuvenating effect, and it's probably because the electrolytes were jacked anyway. Magnesium, same thing but magnesium malate because magnesium malate helps with Krebs cycle and they're magnesium deficient anyway. You might not be magnesium deficient, it might not have worked for you. The role of malic acid and Krebs cycle is pretty important.
- Ben: Sounds interesting.
- Dave: I found tossing it in there along with some methylcobalamin, just the [inaudible 00:21:30] stuff. Also, [crosstalk 00:21:31] mitochondrial energizer.
- Ben: What I did use when you're talking about the Krebs Cycle is one of the ... Lactic acid gets a bad rep, obviously. It still does an exercise which is dumb because the research has been out for over a decade that shows that lactic acids, pretty efficiently can get converted into glucose via something called the Cori cycle and utilize as a fuel during exercise as long as your body is efficient at doing that.
- A big part of creating that efficiency, things like weight training, high intensity interval training. Believe it or not, the isometrics combined with the electrical muscle stimulation that we were doing down at the biohacking event, that's very good at just jacking up a ton of lactic acid at the muscle level, and then training your body on how to elevate the levels of buffering enzymes, and also to get into that Cori cycle more efficiently.

Oxaloacetate, I was actually using the [crosstalk 00:22:32] anti-aging.

Dave: Yeah, that's the stuff I've [upgraded myself 00:22:34] on my products. Cool. What about that?

Ben: So, two a day, before every high-intensity interval training session, and then six during Ironman. Two before, two at special needs of the bike, and two at special needs of the run. I was able to take a lot of the lactic acid I was producing and convert that via the Cori cycle in the glucose. Basically, the way that I understand it is oxaloacetate supplies some of the NAD which is a rate-limiting step in the conversion of lactic acid and the glucose. You're just accelerating your body's ability to be able to take what would normally be potentially a damaging metabolic byproduct and reconvert it in energy that you can use.

It's almost like you're not having to take in as much carbohydrate because you're body's making some of its own glucose itself as a byproduct of the pyruvic acid that builds up during exercise.

Dave: Yes, that matches my experience and understanding which is kind of cool. If it's about athletic performance and just hacking the Krebs Cycle, there's a lot of work to be done there especially in pro athletes. I think we have just barely scratched the surface. The cool thing is when you're hacking Krebs Cycle, you're not taking performance-enhancing drugs. You don't need Pharma to do it. You mostly need nutrients. You don't even need herbs for most of that. It's just a long-hanging fruit from my perspective.

Ben: That, and just a little concept of increasing mitochondrial densities so that you've got more mitochondria turning out ATP in general. Things like cold thermogenesis, even limiting carbohydrate intake and increase mitochondrial density just because of the increase in fat oxidation, or the hypothetical increase in fat oxidations that I'm actually going to look into or find out more about next week.

Dave: On cold thermogenesis?

Ben: No, during exercise.

Dave: Oh, during exercise.

Ben: The question is, when you're eating a high-fat diet, do you actually oxidize more fat during exercise? The research has kind of [spurs 00:24:37] on that. That's one of the things that we'll look at next in the lab or that Jeff Volek is going to release when he releases that study. So, yeah, ultimately increasing mitochondrial density should be one of the Holy Grail goals for not just an endurance athlete but I mean, like whatever, a CrossFitter, Spartan racer, anybody out there competing and wanting more energy.

Dave: Speaking of people wanting more energy, let's switch gears a bit. Let's say that you're not a massive athlete, you know, you do your 15 minutes a week of high-intensity intervals either sprinting or heavy lifting; what would some of the recommendations you've seen from your work, how they generalize to mere mortals from an athlete's perspective? What would you do for mitochondria, the top five things or something?

Ben: One of the things that you can do even if you're not doing the far out electrical muscle stimulation type of protocols is just those isometrics that we talked about. For example, getting into ... I don't know if you can even see it in the video. For example, one of the things that we did during your biohacking conference, we were just getting to a lunge like this and hold. I got myself to the point over this summer where I could hold a lunge position or a squat position, or like a deep push-up position for six minutes.

When you're doing that, you're building up of that lactic acid. It's something anybody can ... I mean, you can do that in your office. You don't have to be an extreme athlete and it's actually very, very low in terms of the amount of joint impact that occurs when you're just doing isometric holds. That's one thing. Cold exposure can help out quite a bit. Cold thermogenesis, there's companies now like I mentioned; they're making them like a vest that you can pack with cold as well as belts like a Cool Fat Burner vest.

Dave: I'm actually using the pad from a Cool Fat Burner vest right now underneath my laptop to keep the fan from turning off.

- Ben: I thought you're going to say you use it in your butt to keep you from forming all that brown adipose tissue.
- Dave: No, I'm standing.
- Ben: You're standing. I am, too, actually.
- Dave: I have this really cool thing I got to show to you because you'll like it. It's a prototype of an electric desk that moves from sitting to standing. You just push a button and it goes up and down.
- Ben: It's that the [up-desk 00:27:05]?
- Dave: No. It's not available on the market yet.
- Ben: Okay, nice, cool.
- Dave: It's pretty cool.
- Ben: I'm actually in a house I'm building about 4 miles from here. I've got all the windows in the office elevated and the entire thing builds at the desk wraps around a treadmill workstations so I can walk and stay moving the entire day while I'm working. That's also really important just like hacking your environment so that you're on your feet all day, you're moving, you're shaking. Then, at the end of the day, you can a very small high-intensity work out on top of that.

Again, it returns to that concept of minimal exercise. I talked about training 8 to 12 hours a week for Ironman. One of the ways that I did that was moving all day long so the human body has a great amount of natural endurance capability; our ability to cool our bodies, our ability to go for long periods of time. That's not really a weakness per se in the human body as much as strength, power, speed, mobility, some of these other elements.

What you do is you just keep your body active throughout the day, and then at the end of the day, you do whatever, like a high-intensity Tabata set like 20 seconds on, 10 seconds off, 8 times through for a total of 4 minutes after a good warm up and a good cool down. Or you do a weight



training set like I really like especially for the general population because it's safe and it's really effective. Doug McGuff's Body by Science approach ...

Dave: It's what I recommend on my site, too. It's so awesome.

Ben: It's cardio and weights at the same time. You can do it with a suspension strap, like a TRX if you're traveling. You can do it with body weight. You can do it with machines at the gym. The way you do it is you choose about four to five multi-joint exercises. Let's say you're at the gym, you go over to the area where the machines are, and you do a machine chest press, you do a machine seated row, you do a machine leg press even though it's biomechanically messed up if you don't know how to squat or lunge properly. It's better than nothing.

You do a cable pole down, and these are all exercises that it's almost like the machine walks you through the exercise. Then you do, for example an abdominal crunch machine.

Dave: And you're doing this all [crosstalk 00:29:34] super high weight, right?

Ben: Relatively high weight but even more importantly especially for people who are just getting started in this or want to gradually get their body to the point where they can do more. A weight that gets you tired if you're doing 10 seconds up, 10 seconds down framework from about four to six repetitions. You're shooting for a time under tension of 60 seconds or so for each muscle, for each set. It's very slow, controlled. It's like, you want to get it faster but you don't allow your body to.

You can do each of those exercises just one time or you can get up to the point where if you want to exceed the 12-minute protocol that's in Doug McGuff's book, you can do it two or three times. I know a lot of the strength-conditioning coaches who might be listening in are cringing when I'm talking about the leg press and the ab machine. But for people just getting started, this stuff works. Then, you could take the same type of protocol once you've gotten stronger, and you can get a suspension strap, and this is something I'll do at home.

I'll put the suspension strap on my door, and do a super slow push-up, put one leg in it, do a super slow lunge, change the other leg, do a super slow lunge on the other leg, stand up, do a super slow standing row up and down. What happens is, you get increased blood flow or increased venous return to the heart as you move those muscles very, very slowly. You're training yourself to become stronger from a cardiovascular standpoint while also making your muscles stronger. You get the best of both worlds.

Dave: You're looking there like training your ejection fraction in the right direction versus chronic cardio.

Ben: Exactly. It's an increase in blood pressure but it's not an increase in central blood pressure which a lot of people consider to be stressful in the heart. It's an increase in peripheral blood pressure which forces blood back to your heart while still allowing you to have good cardiac outputs. It's just a really cool, smart way to train especially if your time is limited.

Doing that and alternating one day of something like that with one day of high-intensity interval training, and then one rest day or like a mobility or yoga, or foam rolling, or a restorative day is really a sustainable program for people especially if they're combining that with whatever, standing work station, time on the feet, maybe even greasing the groove with like, you know, I've got a pull-up bar in the door of my office, and just do a few pull-ups every time I walk under it.

That was how I trained for Ironman with minimal time was basically staying on my feet, and keeping myself active, and then doing short exercise sessions at the end of the day to just put a little bit of speed or power, or strength on top of the endurance.

Dave: It's amazing what a little movement will do. I'm not sure that I can convince myself to walk on a treadmill. I know Chris Kesser, when he's on the podcast, he was talking about it. I have a treadmill but honestly, I didn't find it useful for doing intervals on it because you can't get it fast enough and you can't get it slow enough for real interval training. It's

kind of like, it was a closed rack for a while, and then it's now sitting in a shed somewhere.

What I'm doing is every one or two hours, I'll do five minutes of Bulletproof Vibe, the Whole Body Vibration which is different than a treadmill but it's causing the same lymphatic circulation. It just happens on a much faster basis and it causes more of the bone stress which keeps your bones healthy. I don't know that there's a justification for a vibration stand-up desk because you don't want to vibrate all the time. I don't think ...

Ben: For those of us how are podcast, that might backfire.

Dave: Yeah, you're sort of sitting there jumping up and down. Your voice wiggles.

Ben: Yeah, exactly.

Dave: In terms of just keeping the brain going, and keeping the circulation without having to walk all the time, I'm pretty sure that's going to be my standard going forward, but I'll tell you in a while because there isn't really any research about what happens when you vibrate for a little while every hour versus just doing 10 or 15 minutes a day which is what most of the research is about.

Ben: Yeah, exactly. Even for folks who can't afford a vibration platform, I know yours is kind of like, no frill, right?

Dave: It's 1,500 bucks, handmade steel, and no handles so it fits under a bed.

Ben: Compared to the \$10,000 to \$15,000 force placed vibration units that you get from the biomechanics labs, that's not bad.

Dave: The TurboSonic is [crosstalk 00:34:02]. Yeah, if you have 10 or 15 grand, buy the TurboSonic and I lust after those but I'm not exactly rolling. I'm not wealthy.

Ben: The other thing that works out well as far as lymph flow especially for capillarization to the head is inversion. I've got an inversion table and a

Vasa Trainer which is like a horizontal kind of swim trainer at my garage. Inversion is pretty good for that. It's not obviously something you can do while you're working, but I usually go out there about three times a week for 5 to 10 minutes, and just hang and do some gravity sit-ups, and some traction for the hips.

Dave: It sounds kind of ridiculous but one of the really good ways to increase cognitive function and you know, that's kind of my sport if anything, I want to feel good all the time and be able to think of stuff when I want to think of it. Hanging upside down, being inverted increases those brain capillaries. They actually get stronger and you get more of them.

Ben: It's kind of weird. If you take somebody who's never hung upside down, and you see them, they get extremely red in the face. They get very, very uncomfortable when they first get on something like an inversion table or even in like an inverted position during yoga. Within just a few weeks, they can be inverted and be just fine. You don't see the same amount of redness in the face. You can actually witness the capillarization almost like morphing someone's body within just a few weeks of inversion training.

Dave: I have to say one of my favorite things about yoga classes is the first time someone kicks up and do a handstand. You've probably seen that. People, they'll scream. They'll be terrified. It's like, "No, actually, you're not going to die if you're upside down, I'm pretty sure." But that's all sympathetic activation and just this pushing your comfort zone, and pretty soon their whole vestibular system adjusts, and then their capillary change the way their body regulates blood pressure changes.

You've got a couple of five-year-olds. I've got a four-year-old and six-year-old, and I've been holding those kids upside down since they were little kids. I can hold them above my head upside down for a half-hour and they just think it's funny. I don't know if I've ever gone half-hour, but ...

Ben: I was going to say, that's a good workout.

Dave: Yeah, no kidding. I was like, I do get tired but sometimes I think half of shoulder workout is just for me, throwing kids up in the air and catching them. I think teaching kids to be upside down is actually going to be good for their circulation system and good for their nervous system, not to mention sympathetic and parasympathetic activation.

Ben: Yeah, absolutely.

Dave: You're an Ironman athlete, and you got two five-year-olds. How far are they running now? What's their sprint time?

Ben: They've done six triathlons.

Dave: No, really?

Ben: They have, yeah and they're training for their first Spartan race right now. I've built an obstacle course up on our land here in Washington and we've got tire flipping the other day and rope climbing. We've got spear throws. I've got a bunch of hay bales hanging from the trees, and these spears that I made from roofing nails and broomsticks, because the spear throw is part of the Spartan race.

Then we've got cinder blocks that you drag with chains. I'm building an obstacle wall right now that you can actually ... It's like a rock climbing wall that you can climb on sideways but then also practice crawling under, leaping over, doing pull-ups on. We've got bucket carry, sandbag carry. I'm basically taking my entire land and turning it into a giant gym. My kids are pretty active. I don't know if I want them to do triathlons or Spartan races or things like that when they grow up because you can't get college scholarships for any of that.

I played tennis in college, and I've had them playing tennis. They're right-handed and left-handed. They've been playing since they're about three. I'd kind of rather them hone that skill over running for long distances but yeah, they're active for sure.

Dave: That's pretty funny. But you said they actually have done triathlons even though they're five.

Ben: Yup, they have.

Dave: I didn't know they had five-year-old triathlons.

Ben: They have the Ironkids races. It's kind of scary. They have like, there are some kids that are out there running half marathons, even like seven and eight-year-old kids. I don't think that's healthy.

Dave: No, it's dangerous.

Ben: These are short. We're talking ... They swim across the pool, they get out, ride their bike a mile, then they run around the track.

Dave: Oh, that's cool. I think that's amazing. It's going to be so good for their sense of accomplishment.

Ben: Yeah, exactly. It's just the look on their face that's priceless when they cross the finish line. I really don't think that it's doing a number on their hormones or their bone density, or their development, or anything like that.

Dave: That's actually helping them in everything I understand about child development. It's always interesting to talk with people who are pro-athletes who are serious about what they do with their kids. If you have a five-year-old and you're a football player, you're like, "Okay, are you going to teach him to teach football or are you worried about concussions?" You can learn a lot about the way people think from something like that.

Let's see. We talked about basically biohacking your kids' exercise. We talked about mitochondria, fat burning, ketosis, triathlons. What have we not talked about that we should talk about, Ben?

Ben: Well, you know, one of the things that I think is important and something I think that both you and I do that we touched on briefly is tracking the strength of your nervous system. That's one of the things that I did all during my Ironman training and still do every morning is heart rate variability testing which is so cheap, and easy, and effective to

do these days that I think that that's something, especially if we have athletes listening in which I know is probably going to be the case.

I can't talk to athletes without recommending that. I think it's going to be something every team and every athlete is on board with in the next decade just because it allows you to so easily track whether or not your body is ready for say, like an interval training sessions versus an aerobic session, versus a rest day. It allows you to look at both sympathetic and parasympathetic nervous system readiness and strengths. It lets you keep a quantified running number on your recovery. It's easy to do.

I use the [inaudible 00:40:30] app with a wireless Polar H7 monitor every morning, and that's the way that I've been testing. I know they're coming out soon with some kind of a wearable thing that you can put on during exercise but I think that's really important.

Dave: I've partnered with the [inaudible 00:40:47] guys, and we're making HRV sensory test with a very similar functionality set but there's a stick on Bluetooth wearable patch. It's out there. I've got a couple demo models of that.

Ben: Yeah, I've got one somewhere.

Dave: You probably have one there too, I'm guessing.

Ben: Yeah, I have a whole drawer-full of stuff here. That's on my to-do list to try. Yes, I used the wearable patch.

Dave: Do you sleep with the monitor on?

Ben: No. I pretty much ... I'm building a house right now. I've got kill switches installed in all the bedrooms. It's all wired, shielded wiring. Basically completely non-toxic woods and everything that you can do to make sure that you're mitigating your EMF exposure, mold exposure, and things of that nature. I think that there's more cons than pros to having stuff plugged in and running, and turned on in the bedroom while you're asleep. About the only thing I have is I run in EarthPulse, pulsed electromagnetic frequency device under my mattress.

Dave: [Crosstalk 00:41:51] sleep with that?

Ben: I do. I actually use two. I use a headphone splitter, and have two magnets attached to the EarthPulse unit, and I feel good when I sleep with that and notice the difference especially in terms of recovery.

Dave: You put on setting 1 or 2?

Ben: It's called the Recovery setting. Sleep 1, Sleep 2, Sleep 3, and Sleep 4 but I just use Recovery. I put that on, and everything else is unplugged. Sometimes, I run my phone with the White Noise App on it, but it's on airplane mode. I don't really sleep with much on as far as monitoring devices, or Bluetooth, or anything like that.

Dave: I don't sleep with the Bluetooth on. I've done it a few times with the chest strap, but even during the day, I don't want to wear a chest strap all the time, shooting Bluetooth right out of the middle of my chest which is where I'm electromagnetically most sensitive. When I run the EarthPulse, it actually disturbs my sleep. I get a sense of anxiety. I can do it for one night. The next night, my body's like, "That's not right." I can do other PMF devices.

The EarthPulse has a really strong effect. I can tell you when it's turned on across the room just because I don't have ... built a lot of awareness for these things. At least for me, it works. It does a lot of really interesting biological stuff but I use it for a short period of time. Then, I use another big mat that has multiple coils with different pulse frequency setting for different organs, and things like that. There's a lot to PEMF.

Ben: Is that like a Magnetico or a Biomat or something like that, or something different?

Dave: No, it's a pulse coil mat. There's [inaudible 00:43:30]. There's mats and there's iMRS, and there's things like that. They're not cheap. It's like you buy a new car or do I want to increase mitochondrial respirations. I know it's important to me.



Ben: A PMF device like the EarthPulse, something like that has actually a greater application to injuries in terms of the actual research especially with bone injuries, and speeding bone healing. That's where most of the good research has been done on PEMF, so stress fractures, bone breaks, stuff like that especially for athletes, that's where you do something like jam the North Pole under the magnet up against the injured area for 15 to 20 minutes a day. That's where you're looking at acceleration of bone healing. But I do like it for sleep.

Dave: The one that I use specifically on injuries or actually quite often while I'm sleeping on the road is the SomaPulse. This one is gentler, and it's been used for a lot of healing and things like that. I stack the coils under my lower back, the lower part of cerebrospinal system, and that has all sorts of cool effects like if there's something that's sore and not working right, but even when I'm flying sometimes. It's less powerful than a cellphone but the pulsing and the shape of the field matters. If people want to check out the SomaPulse, just go to SomaPulse and check it out. There's a code. It's either BPE or Bulletproof, one of the two, and that gets you a very large savings.

It's an interesting technology and I think it's important that people understand that these devices, you know, the EarthPulse we were just talking about, the SomaPulse, and these other more expensive things, they have biological effects that are well-established. Your cellphone is pulsed electromagnetic field generator as well but we haven't looked at the modulation effects of that.

I know you're as concerned about EMF as I am. I use electrical filters, and whenever I end up, getting a place, I'm planning to do the similar things where you put shielding in, and you put potentially even a metal roof that's grounded. I think that's kind of like ... Are you doing that on your house?

Ben: No, we just have the ... I forget the name of the roofing material that we're using. It's not a metal-grounded roof though, although it does have a metal snow catch around it so we might be ground that. I'm not sure if that would have effect though.

Dave: I don't know what that would do either. It's probably a good idea but that's probably beyond my pay grade. You have to find someone who's really good at physics or electro engineering to really understand what a grounded ring around the top of your house would do. My old office was a Faraday cage so I'd actually built it using ... It was like one of those offices in a garage. I built it using foil-lined foam, and then I used electrically conductive tape to bind it all together and grounded all of that.

You could see, going there your cellphone signal will just die. If you hold it by the window or the door, it wouldn't die because I didn't bother getting screens to cover it. But you can feel when you meditate in a Faraday cage like that, there's a difference biologically and it's pretty obvious.

Ben: Yeah, yeah. I like it.

Dave: I'm really stoked on hearing about your new house, Ben. I think it's going to be [crosstalk 00:46:47].

Ben: I'll have you down once it's done. We're putting in ducks and goats, and basically kind of making it the ultimate healthy pad.

Dave: We're in the same mindset there. I'm not close on it yet but I'm really hoping that I might get a local place here which would support, honestly healthy soil. You get the health soil, and health animals; you get good bacteria, you get healthy food and healthy sunshine. Anyway, I'm eager to see what you've got going on out there. I'll probably end up giving you a call if I end up going down the same path on my place.

Ben: Yeah, have you done the hangout and the infrared sauna?

Dave: That would be beautiful. God, funny enough, that's something that I would do as well. My sister lives in Spokane so it's easy for me to have an excuse to come on down.

Ben: That's right. Actually, your sister lives I think near North Spokane.

Dave: Yeah, she's on the north side.

- Ben: We'll be about basically like five minutes from your sister's. There you go.
- Dave: It's a small world. I got to say if my sister's listening, and to you, Spokane is in the middle of nowhere. It's like so far [crosstalk 00:47:55].
- Ben: It is, which is why I live here.
- Dave: I'm on an island. We're not that far away in our thinking there. Ben, thanks for being on the show, man. You know what's coming up here in terms of questions. The final question of the show, it's always the same. Top 3 recommendations for people who want to kick more ass. It doesn't have to be triathlons or any of the stuff you've done, just what would you recommend people pay attention to?
- Ben: Number 1, and this would be based off of research that has been done to show what single variable is the most important in making you live longer, and that would be none of the things that we've just gotten talking about. But instead, the amount of love and relationships in your life. That would be Number 1; quality relationships either with your loved one or with your kids, going out of your way to give hugs, to hang out with friends, to build your social network, that is the single most important thing you can do.
- I like the book *Never Eat Alone* for example which is really good at just helping get outside your comfort zone, go out, meet people, build relationships, and also ensure that the relationships in your home are really, really quality. That would be the Number 1 thing.
- Number 2 would be music, and I say that because I grew up playing violin. I played violin for 13 years, and then got into a band in high school. Now I play guitar a few times a week. Not only is it therapeutical and like Abel James, had a great presentation at your biohacking conference about this, but it helps to grow your brain. It helps to grow neural networks. It helps with learning, memory formation. To me, it's more interesting than playing *Luminosity* or doing N-Back training like learning a new song in the guitar is just way more stimulating and fun for me.

Even if you don't want to play an instrument or learn to play an instrument, like yesterday, after the work day, I just put on a new guy who I saw at a coffee shop here in Spokane who's music I really like. He kind of sounds like Ben Harper who is one of my favorite musicians. I just went out on my dorkey, stand-up, elliptical trainer device, and rode around the neighborhood in the sunshine listening to this guy. It's just incredible therapeutical in addition to its neural effect if you're actually learning music.

Number 3, I'd say would be ... I'm going to throw one out there for the athletes that are listening in since I do know we do have some athletes listening. That would be really learning how to do rhythmic breathing while you're exercising. What that means is when you're exercising, you should not just be training your muscles or your cardiovascular system. You should be training your cardio-respiratory system.

When you learn how to do nasal rhythmic breathing such as for example going for a run, only breathing through your nose and doing something like breathing in for 3 strides, breathing out for 2 strides. That's like a 3-2 breathing pattern. When you learn how to do that, exercise turns into a more focused meditative activity. You get a lower cortisol release when you're doing the deep nasal breathing versus the shallow chest mouth breathing. You train your cardio-respiratory system, so your inspiratory and expiratory muscles, your diaphragm, they become stronger.

There's some really good books out there that train you how to do deep breathing, nasal breathing, and rhythmic breathing. Two of the really good ones are Running On Air by Budd Coates. It was a book put up by Runners World, and a lot of the books are just stretches and exercises, but the very first 100 pages of the book teach you everything you need to know about rhythmic breathing. Then, for the nasal breathing components, there's a guy named John Douillard who runs holistic spa in Boulder, Colorado and he works with a lot of athletes and he wrote a book called, I think it's Life, Body, and Sport, I believe is the name of it. It trains you how to do that deep nasal breathing and do it efficiently enough, you don't feel like you're having to suck air during exercise.



I'd say relationships, music, and rhythmic breathing.

Dave: All right. We'll put links to those books in the show notes on the side on Bulletproof Exec. Ben, thanks for coming on the show, man. Thanks for doing all the cool biohacking stuff you're doing. Hope to see you at our biohacking conference later this year whenever we figure out the date.

Ben: Man, I'll be there.

Dave: Awesome. Catch you later.

Ben: All right. Later, Dave.

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