



## Transcript of “299 with Dr Veech”

Bulletproof Radio podcast #299



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Speaker 1: Bulletproof Radio, a state of high performance.

Dave: Hey, Dave Asprey with Bulletproof Radio. Today's cool fact of the day is about Ketosis. Did you know that your alcohol tolerance is severely lower while you're in Ketosis? There are a couple of reasons for that. The first is that the alcohol you drink when you're in Ketosis will get metabolized immediately before your body keeps burning ketones for energy. The carbs in your system that are normally used to "soak up alcohol in the stomach" and slow down the intoxication process probably won't be there if you are drinking while you're in Ketosis. Not to mention, it's difficult to stay in Ketosis while you're drinking. You got to ask yourself, "Is it really worth it to have beer which is going to take you out of Ketosis or red wine which is going to take you out of Ketosis or vodka which may or may not take out?" I don't really think it's worth it.

You don't get a lot of performance benefits from those things. They can be fun, there are lots of other ways to have fun though too as well. Before we get in to today's interview, which is one of the Luminaries in the field of Ketosis, this is the brand new Bulletproof insta-mix. It's a product I've been working on for three years to get it made just right. This is a mix of grass-fed butter and brain octane oil that we finally got into a stable powder that mixes easily, just put it in a sealed Bulletproof coffee mug, shake it up or hit it with a little tiny hand-blender thing. You have Bulletproof coffee, something you can brew with our Keurig compatible pods or if you just make a little French press at your desk, the idea is you can have Bulletproof coffee anywhere and that's cool because it's got no carbs that are going to take you out of Ketosis and because it tastes good and it does those things. Right now, hundreds of thousands of people rely on Bulletproof coffee in the morning to get a little bump in their ketones.

They get an unnatural little bump because of the brain octane that's part of the core recipe. It works differently than just say, coconut oil. I've been working on this for so long, I'm so stoked to bring it to you without any of the crap additives so I'm excited. We're going to talk about it and go even deeper in today's show with Ketosis because our guest is Dr. Richard Veech who is senior researcher and laboratory chief at the National Institute of Health, and winner of the NIH Director's Award which is very prestigious. He has been working to understand the mechanisms behind cellular energy homeostasis for the last 47 years. He has got two degrees, a doctorate of medicine from a little university you may have heard of called Harvard, and is the foremost researcher and expert of all things Ketone esters. Dr. Veech, welcome to the show.

Dr. Veech: Thank you.

Dave: What did you do before you became a medical doctor? What did you study in your undergrad that maybe gave you a different perspective compared to the average just-doctor?

Dr. Veech: As an undergraduate in the university, I studied history and literature, which was a very interesting department. It was founded by a chemist, Charles Y. Eliot who decided that everyone that was educated need to have knowledge of the Bible, Shakespeare, Greek history, Greek tragedy, Russian novel, and a foreign language. You had three-hour oral exams. It was very good, very good, very good undergraduate education.



- Dave: You started out with something that isn't traditional for someone that went to medical school. You also, along the way, got a PhD as a research biochemist as well, right?
- Dr. Veech: That's right. Yeah. I did that after I was at my residency in medicine.
- Dave: There are very few physicians who also study biochemistry at that level. Why did you decide to do that? I don't want to say almost unheard of, but it's so rare and it gives you such a different perspective on things. What made you go to that level of effort?
- Dr. Veech: Well, if you have been an intern and resident and you've seen a few people die, you realize that you really don't know very much at all. You better go learn some more. That's what I did. I looked in a bunch of different labs, I ended up going to a lab, I thought was the best in the world, I think that was right. It was at Oxford and I studied with Sir Hans Krebs. He is, I think, still the best biochemist of the century. That's where I learned my biochemistry.
- Dave: For people listening, this is none other than the guy who discovered the Krebs Cycle, which is why it's named after him, right?
- Dr. Veech: That's right.
- Dave: This is the core of how our cells make energy via ATP. In my own losing of 100 pounds and getting my brain back, I read all of Krebs' things and everything I could about the citric acid cycle to find ways to make it work better. Wow, if you fixed your mitochondria and improve their performance, even a small percentage, it just pays dividends everywhere in your body. That's why I was amazed you actually study with the man.
- Dr. Veech: Well, the essence of what we're saying and how ketones work is precisely in the Krebs cycle. Many many diseases, for instance, you're to be congratulated for losing 100 pounds. People that are overweight, have an impaired Krebs cycle. They have an impairment in their entire cell and in a sense just doesn't work very well. Ketones bypass that block of PDH. All of the things we're saying about Ketosis are applicable to Type 2 diabetes, are applicable to injury, to infection and even a number of diseases. For instance, Alzheimer's disease is a block in PDH in the brain. It's a central gateway into the Krebs cycle but it's very easily disturbed. When it's disturbed, you can get around that disturbance by giving ketones.
- Another thing I'd say is ketones, doctors tended to fear ... Ketones are discovered in Germany in the 1880's. People are afraid of them because they knew about diabetic ketoacidosis. On the other hand, a man named George Cahill, who was professor of medicine at Harvard showed that the brain, the only substance that the brain could use to produce energy aside from glucose was ketones. He further showed that really, ketones occur normally when you starve. I starve you for five days, your ketones are up to 7 millimolar. This allows you to live. Man is the only animal that get ketosis normally and that's because you've got this very huge brain that you've got to support. If you had to support on glucose, you'd be dead in six days as it is. A normal weight can live 76 days. An obese man live, less than, definitely. That's really the substance of ketones.

There is nothing dangerous about, it's a normal state of man. Before we had McDonald's on every corner, we fasted in between the time we were chasing the mammoth and we caught the mammoth. In order to do that, you needed to be ketotic. That's why we have ketosis.

Dave: Now, when you say there is nothing dangerous about ketosis, I wonder, I know many people who can go in ketosis, and they stay there for years and they're happy as clams. When I tried an experiment of extreme low carbs, like one serving of vegetables a day, the rest fat and some protein, tried to mimic an Inuit-style diet. I didn't do so well. I ended up in my book recommending cyclical ketosis where you go into ketosis, you come out. You go in, you come out, rather than constantly being in heavy ketosis. Do you think there are risks to being in ketosis for long periods of time or is it something that just works for most people and I'm an exception on that one?

Dr. Veech: No. Some Canadians, name of I can't remember right now, studied the Inuit diet. They ate just nothing but fat and meat, fat and meat. They felt really sick and didn't do very well.

Dave: Yeah, that's totally what happened to me.

Dr. Veech: Yeah, they couldn't figure out what it was. It turns out when you go up and look at the Inuits, they drink the broth. They're eating a large amount of salt and so they can get away with it. If you do what you think the Inuits are doing, which they didn't do, you don't do very well. You feel sick.

Dave: Yeah.

Dr. Veech: I can remember the man's name.

Dave: I think I read that too. There is also the so-called animal starch collagen which functions in the gut as a fermentable substrate for bacteria to make short-chained saturated fats. I think at the time, I wasn't using my collagen when I was making bone broth. The Inuits were definitely boiling whale bones and doing all the other crazy stuff. I think I made some mistakes there. The core thing there, even if we're not going quite the Inuit side of things, I have talked to Dominic Agustino who I have great respect for, and of the other researchers in this field, I was an early ketone advocate. I still don't know the answer. I realized to reach the maximum number of people going in and out of ketosis seem to be the broadest thing to provide benefits. I still don't have from an expert, "Everyone should go and ketosis and stay there most of the time or not," or "It's safer for them to do it but it's up to them." What's your take? You have more experience in this than honestly anyone I've met.

Dr. Veech: Well, it depends how you do ketosis. If you're doing it with a very very high fat diet, people can't do it very long because it's so unpalatable. They can't stand it or they get nauseous or they get diarrhea. That's one way. If you're just starving and eating water and what not, there is not a problem with it. In fact, you're very hungrier with of course for five days; after about five days, you're no longer hungry.

Dave: Yeah. I know that when I'm doing a normal high fat diet, that hunger thing, the induction period

you get at ketosis that Atkins I think first popularized.

Dr. Veech: Yeah.

Dave: It makes you feel, like the flu. You feel really crappy. What I've been doing for the past 10 years or so is short circuiting that because I finally found the research that I think explains it. That when you have a level of just a 0.05, a pretty far cry from 7 millimolar. Your CCK and your ghrelin, these are your hormones for fulfillment, for feeling full and your craving hormone, your hunger hormone. They get shifted by just a small amount of ketone. You're not quite in nutritional ketosis but you're way higher than normal. All of a sudden, all of the carb flu things that I was used to having, where I just feel crappy, they just went away because my hunger, I wasn't craving. I didn't care about food the first day I did. That comes from putting brain octane which goes to BHP, which then goes to ketones in Bulletproof coffee.

There is no carbs. There is something that just gave me a little bump of ketones, not a big bump. That seemed to help, but what you're talking about is getting huge bumps of ketones because we know there are three kinds of ketones that are used differently in the body. Can you go into more about the different kinds of ketones and that hunger suppression thing?

Dr. Veech: Well, the suppression of hunger really is a function of beta-hydroxybutyrate, acetoacetate doesn't work very well. The third thing is called a ketone, is acetone. It really shouldn't be called a ketone. It's very small in amount and it has a completely different metabolic path. You've got two major forms of ketones, ketone bodies. One is called beta-hydroxybutyrate, and one is called acetoacetate. Now, if you eat a lot of acetoacetate, it can be metabolized. It doesn't have the energy that beta-hydroxybutyrate. It's going to go and ...

Dave: How would I go about eating aceto acetate?

Dr. Veech: Well, you can buy it. There are people that make ester with it.

Dave: Okay.

Dr. Veech: I don't recommend it. Reason is Krebs in the late 1960's showed that you could take a hurt heart that wasn't working and profuse it with acetoacetate and did just fine. If you did a working heart and you profuse it with acetoacetate, it failed immediate, instantly. If you fed it beta-hydroxybutyrate, it pumped normally. That's what we did in the SATA paper. The reason is it's going in the mitochondria. When the ketone body goes in the mitochondria and you're giving it acetoacetate, after a little cap, it's called NAD capulle, gets oxidized. With beta-hydroxybutyrate, it gets reduced. A remarkable thing about metabolizing beta-hydroxybutyrate is it reduced the NAD but you oxidize the next step up the Q. You increase the redox span between NADH and Q, that determines the energy at ATP.

This is why you get more energy. It's why the heart gets 38, I can't remember, 38% more energy when it's metabolizing ketones bodies and it is when it's metabolizing glucose. I told a very famous biochemist named Henry Lardy who find the enzyme at the University of Wisconsin. I said, "Dr. Lardy, I've increased the energy of the heart by 38%." He said, "I don't believe you." I

said, "All right, what number do you want me to change?" There is just pressure in volume, that joules. Then he looked back at his work, he was preserving bull sperm for the dairy industry. He found that beta-hydroxybutyrate was the best substrate he came across. He couldn't understand why. Now, I'm telling you why that happens.

Dave: It's because mitochondria love that stuff and sperm are incredibly incredibly high in mitochondria because they have to swim or they don't survive.

Dr. Veech: That's right. If you're trying to impregnate a cow, it's very important that you have healthy sperm. The dairy industry was very happy of Lardy ... He had a question in his notebook, he showed me, "Why does this happen?" He never went into it but I just told you the reason that it happened.

Dave: What I've discovered in my own life is ... I take a precursor to BHB, that's brain octane. I've never heard the 38% number before. I feel such a huge performance upgrade because the place with more mitochondrial density in the cardiac system is the pre-frontal cortex, I actually found studies of mitochondrial density. They're actually hard to find. I did a ton of this when I was writing my Bulletproof Diet Book to explain why do I feel like I got my brain back when I do this versus why I don't. I think you just named a number that I didn't have in my research which is annoying. 38% better from having BHB present versus having just glucose present.

Dr. Veech: That's right. MCTs or Mid Chain Triglycerides, they do 10% of that, that goes directly into the mitochondria and is directly converted to ketone, probably 90% is metabolized by beta-oxidation.

Dave: Doesn't that depend on which MCT it is? Because lauric acid doesn't work at all, which is the most common MCT.

Dr. Veech: The 8 is the maximum, to get to maximum ketone body production ...

Dave: That's what's in brain octane. All it is is 8. I take away the 10 and 12 and 6, yeah.

Dr. Veech: Sure, well, I mean, people like Mary Newport recommend the C12 because it tastes good, coconut oil tastes good. From a biochemical point of view, we don't care if it tastes good.

Dave: It's true. There is no flavor to C8 when it's properly distilled. You can't taste anything, it's a flavor enhancer but by itself, it's even less than a Konolo Oil in terms of flavor. I would eat if it tasted like rat liver, it doesn't matter because you feel different. That's my whole ethos, I'd eat a bowl of gravel for breakfast if that's what made me feel like this. What you've done though is, in 47 years of research, you've also worked with some other guys like Dr. George Cahill, who is one of the main things. Can you tell me some of the stories about Dr. George Cahill and your work with him in discovering all these things?

Dr. Veech: George Cahill really, this work all comes from George Cahill because he, I told you, was the first man to show that the brain could use ketone. Before that, before his time, it was thought it could only use glucose. He showed that it could use ketones. Now, he then was a good friend of

Krebs and was in a meeting in Minneapolis. He asked Krebs what the redox state of the NADP system was. No one knew. I got to Oxford, Krebs called me in and said, "That's your project. Tell me about the NADP, and free ratio of NADP and BH because that's involved in all fat censors and reducing free radical." I worked for a year in planning out the answer, when I had showed it to Krebs, he said, "Well, that can't be right." I said, "Well, it is right." He didn't say anything about two weeks. He thought about it for two weeks and he came back and he started writing. That was the longest paper he ever wrote. That paper shows the relationship between the redox states of the three great nucleotides and how they related to ATP because the energy of ATP is redox energy.

Another fact that ketones do, aside from increasing the energy of ATP is they increase the reducing power of the NADP system. If you have increased free radicals say in Parkinsons disease or a osteoporosis, or in a nuclear bomb, this will protect you from that radiation. That's a major effect, the only third major effect of ketones is there a level of decreased enzyme flammatory reactions which is a different mechanism.

Dave: The enzyme flammatory effects of ketones, I learned about those in a paper just a little while ago, I was blown away. The anti-radiation effect, I had no idea. Does this protect you from all forms of radiation?

Dr. Veech: In what you call ionizing radiation, yes.

Dave: Woah. Basically Iran, Fukishima, we should be dosing everyone with anything that raises ketones?

Dr. Veech: Absolutely.

Dave: Oh my good. Okay. The Bulletproof Diet, I just sold 100,000 copies of the Bulletproof Diet in Japan without trying. I am so thankful you said that because when I go to Japan to talk about this, I can talk about this because no one has offered any kind of protection for ionizing radiation. You just blew me away, Dr. Veech.

Dr. Veech: The Tokyo Power Company, I actually trend, Japanese scientist. They really weren't that interested in it. Why? That's I don't think quite well but what I was interested in it was a question of nuclear terrorism. It seems very likely sooner or later that we're going to have a rouge nuclear bomb sitting in Latvia, park across my house. We have nothing to protect our policemen. If you're within a mile, a ton, megaton bomb, you're dead. You're ashes, right? In this area outside of that where you're getting the fall out, that shall make a difference. I'm very interested with the use for radiation for protection at NB-stockpile.

Dave: I'm blown away. My grandparents met on the Manhattan project in Chicago.

Dr. Veech: Really?

Dave: They moved to Los Alamos. My grandmother is a nuclear engineer and my grandfather is PhD physical chemist. I'm a ketone guy, I had never heard this before, Dr. Veech. You're blowing me

out of the water here. This is so cool.

Dr. Veech: Well, there is more correlations in that. Cahill's wife was the daughter of Crawford Greenewalt. Crawford Greenewalt was the CEO of DuPont. He is the one that built the plant that Hanford. All of our ability to produce nuclear bombs in the second world war came from Crawford Greenewalt. He wrote a definitive book on Hummingbird. He ran DuPont. He did that in the morning before he went to run DuPont. Brook Chant and I went up to visit his lab, in the lab in Bloomington. All he wanted to talk about was Alzheimer's disease because his wife had Alzheimer's disease. I can say this now because they're both dead. Cahill's wife was the granddaughter of Crawford Greenewalt. She suffers from and died from Alzheimer's disease.

Dave: Wow.

Dr. Veech: Of course, he was important in Manhattan project, very.

Dave: Very.

Dr. Veech: I'm sure he would have been not surprised at all. He was a very very smart man to say the least.

Dave: Wow. The connections there go so far back, that lab at Hanford used a process I think it was called the permutex. That process for separating plutonium is what my grandfather invented.

Dr. Veech: Is that right?

Dave: It's still used today. Oh my god. Permex, I didn't get his name but ...

Dr. Veech: If that book, the Making of the Atom Bomb, the first five chapters are the best thing that's ever been written on the development of physics in that age. The people that were involved in that, Krebs was also a big friend of Niels Bohr.

Dave: Really?

Dr. Veech: Yes.

Dave: I didn't realize the physics guys where as connected with the biochemistry guys back then because our bodies are biophysical, right?

Dr. Veech: Absolutely. Krebs, Bohr as you know in the quantum mechanics, and he talked to Hisencher, the Germans wanted to make a nuclear bomb. He said, "It would be immoral for physics to be turned to such purposes." Within three days, he was on a boat going to Sweden. Then the British put him on a bomb-made of a bomber and flew him to England where Krebs met him in the auction to come loose. Krebs thought, they thought "Here is this brain and we have just destroyed it."

Dave: Oh no.

Dr. Veech: But he didn't. He came back and they were friends really for the rest of their lives. Both of them received a German Pour le Mérite now. Krebs and Bohr were the only ones that opposed taking Germany and turning it into a pasture. The Americans wanted to say, "Listen, these terrible Nazis need to be destroyed and all their industry goes." Krebs whose father was killed by the Germans because he was a Jew; on the other hand, his mother, his stepmother lived for five years in Germany, was hidden by a German citizen. He didn't feel this, not all Germans were raving Nazis. He and Bohr are the ones that prevented Germany from being essentially agriculturalized, destroy all their science, destroy all their industry. He had a lot of plaque from that but it was clearly the moral thing to do. He was, after World War II, what Lincoln was to the civil war. You could have destroyed all of the Southerners but the better course would be to reconcile. It wasn't just his science, it was his morals.

Dave: He was humanitarian as well. Wow.

Dr. Veech: Yes.

Dave: These are things I did not know. I'm fascinated to learn this. You've also done some work with General Petraeus around traumatic brain injury. You have a pretty amazing history here. Tell me about that.

Dr. Veech: Well, my son is a physician at the VA. He went to a meeting with the VA to hear about traumatic brain injury because at the time, about 60% of our casualties were due to IEDs. He gave me the notes from the meeting. It was nonsense. It was just garbage. It was a whole bunch of people standing around trying to get money from the army and they had nothing to do except getting money. This annoyed me because Petraeus, he is a PhD from Princeton. He went and sat through in the middle of that and more. He sat through this whole meeting of nonsense. I said ... It's just intolerable. I wrote a paper on what the cause is, how you're diagnosed and how you're treated. I sent it to him.

He, at that time, had left the army and was head of CIA. I got a letter, a very kind letter back from him because Petraeus was shot in the chest at a fort in Kentucky. The surgeon that operated on him was trained by George Cahill. I got a letter back from the said director of CIA, the stamp on it said "Love", which I thought was very amusing, a love stamp from the director of the CIA. I'm sorry he left because he was a ... Another friend of mine, Dr. Newport.

Dave: Mary Newport?

Dr. Veech: Yes.

Dave: She has been a guest on this show too. Tell me about here.

Dr. Veech: Well, we were at the Cosmos Club and I saw General Petraeus in another table so I took Dr. Newport over and introduced him. He said, "Well, we made a lot of progress with traumatic brain injury." I said, "General, you have made no progress whatsoever." I had my tie clip on which was an Oxford tie clip and looked at that and he said, "Where is that from?" I said, "That's Oxford." He said, "Well, not everyone can go to Princeton."



Dave: What a great guy, that's hilarious.

Dr. Veech: Yeah. He really is very very very bright. He understood what I was saying. That's a reason I wrote that paper. DARPA, the whole reason we got money to do the ketones came from DARPA, the Defense Advanced Research Projects Administration, NIH have never never has given money for this kind of metabolic research. DARPA wanted it because they wanted to improve the performance of the special forces.

Dave: Yeah.

Dr. Veech: I read this stuff and I told ... I wanted to see the man that wrote it and I said, "Well, I know Dr. Blitzy, I don't know who wrote this but whoever did this, it's full of crap." He started laughing. He said, "Well, I wrote it." I said, "Well, not totally full of crap, just half full." He said, "All right, what would you do?" I wrote him a three-page thing and said what I would do. He gave me 10 million dollars.

Dave: Wow.

Dr. Veech: That's a good scientist because most scientist get bent out of shape when you tell them ... Full of ... load of ... He didn't. We learned in that, my colleague Dr. Clark who is in Oxford found that not only did the rats run more efficiently on a treadmill but their maze performance increased. We were able to improve the mental capacity, the mental function, the maze performance of these rats. Now, she has also studied Olympic athletes. They can grow faster, well, longer. Ketones don't do anything for sprint performance, if you're running 100-yard dash, it's not going to do anything. If you're doing 40-40 or better, it's going to help you. The same is ... Well, since it's a mitochondrial substrate, it doesn't work for sprints, everybody is like so sad. But it will work for bicycling or rowing or those long distance interim sports.

Dave: There are certainly a lot of triathletes who use the Bulletproof Coffee idea, which is a way of getting some ketones in because you feel a difference. I'm not an endurance athlete, I don't even think endurance athletics is particularly good for you. I'm planning to hit a 180 if I'm lucky, not miles an hour, that's years. I'm careful with my mitochondria but I do see that in everyday, there is a certain amount of endurance that's involved if you're going to operate at your maximum capacity. It seems like a noticeable difference to me.

Dr. Veech: If you just look at the general question of ageing, which is what you're talking about, the cardinal theory in the generation of ageing is free radical damage.

Dave: Yeah.

Dr. Veech: This has been known. I just told you that ketone bodies abolish large part of the free radical damage.

Dave: Yes.

- Dr. Veech: Not only will that work in ageing but that would work if you happened to be next to Fukushima. It's the same process. It also lowers the cholesterol. It decreases the blood sugar. It increases your histone deo-sete-lites. It decreases the enzyme flammatory reactions. Many of the hallmarks of the ageing process are addressed by ketosis.
- Dave: There is something a little bit scary about that though. There are studies that show for things like exercise, if you take antioxidants, specifically Vitamin C, Vitamin E, the traditional orthomolecular and antioxidants, that you don't put on muscle. The damage, the short burst of pro-oxin activity that comes from exercise causes a response in the cells where they generate more SOD and more glutathione and things like that, that if you suppress that, you don't get the muscle growth, you don't get the repair. Do ketones do the same thing as these other compounds?
- Dr. Veech: Well, first, let me address the question of taking antioxidants. The ingestion of antioxidants like Vitamin C, if you remember Linus Pauling was a big proponent with these. Krebs wrote in several letters about this. Finally, I saw the last book he wrote and he said to Dr. Pauling, "Please quit lying about that what you do not understand."
- Dave: Really? This is fascinating.
- Dr. Veech: The reason, you can't change the redox state by feeding antioxidants. There is a whole lot of people that ate Q. All you're doing is increasing the total pool of Q. You want to change the ratio of Q to oxidized Q. The redox state of ascorbic acid is controlled by the NADP system. The only way you can control the redox state, the only way I know was with ketosis. You must work with glucagon, you must reduce the NADP system. All these other reducing agents are nonsense.
- Dave: I have a couple other compounds that are shown to change the NAD<sup>+</sup> to NADH ratio in a favorable way. Two of them are in my core products, it's upgraded ageing which is oxoloacetate and the other one is a unique form of PQQ. These are interesting in that they're messing with basically ratios within the Krebs cycle but they're not classical antioxidants like Vitamin C.
- Dr. Veech: The problem, if I can say so.
- Dave: Yeah. I'm very interested.
- Dr. Veech: Oxoloacetate, it's a dicarboxylate. It's hard to get inside the cell.
- Dave: Okay delivery system
- Dr. Veech: There are very few dicarboxylates that I get in there. The virtue of ketones is they're monocarboxylates.
- Dave: They go in really easy.
- Dr. Veech: They go in really easy. Now in Q, I just already addressed that issue, that is by increasing the pool of Q, you'd needn't change the ratio of oxidized to reduce Q. You'd merely increase the

total amount of Q. Now, that for an antigenic point of view, let's say you're kind increased the deltitude of ATP, you've got to oxidize the Q and reduce the NAD couple. That gives you a greater ... That's all done in the SOTO paper. I'm sure you've read or look at it again.

Dave: I'll look at it again. I don't remember that.

Dr. Veech: It's got double pictures, it was done by my colleague, Dr. Hezariah. His pictures are much better than all my blab.

Dave: Well, I'll put those pictures or at least a link to the paper in the transcription of this interview. Can you explain for people listening, a lot of them are driving their cars right now and they're not biochemist, what is Q in the way you're talking about it here?

Dr. Veech: Q is ... The mitochondria is simply a redox motor. It starts with the lowest redox state co-factor, it's called, which is a vitamin. It is called NAD.

Dave: Yes.

Dr. Veech: The electrons are accepted ... All you are is fuel cells. You're taking electrons from the substrate you're eating and combining them with water to make energy. That's what you do. Now, the first step in that transformation of energy is going from NAD to Q. The distance, the redox distance between those two couples is what the term "the Delta G" of ATP. You want to widen that distance. Now, if you're eating fats, say like Atkins Diet, you reduce NAD, which is good. You're reducing that, producing more NADH to NADH ratio, but you're also reducing Q. That doesn't give you an increased span. You decrease the span and therefore, you're energy is lessened. The magic of ketones is it reduces the first one while it oxidized the second one. I don't know anything else that does that.

Dave: In my entire 20 years of trying to get my brain back and working on losing weight and all, I've never found anything more important than ketones either. I've spent hundreds of thousands of dollars on my own system. I've found things that move the needle but this is like a 2%, 5% or like now, I know the number, a 38%.

Dr. Veech: Although don't feel bad, I've wasted 30 years doing this. Don't feel bad.

Dave: I don't feel bad, I feel fortunate because I used to have all kinds of problems that I have largely resolved. I don't think I started out biologically that strong but I'm better now at 43 than I was at 23. That's not normal.

Dr. Veech: Right. That's right.

Dave: You've done something else that I really wanted to zoom in on. Something that I've never talked about this before, but three years ago, I did pay to have ketone esters synthesized. It was shockingly expensive. I got one tiny little vile of it. I said, "This is really neat. I have no idea what it's going to do to my liver. I'm just going to take it." There was no conceivable way I could think of to sell that stuff because I didn't know I could make it affordable. It's a really neat idea but it's

not doable. Here it is three years later, I find out you've been doing all kinds of cool stuff with ketone esters. Can you talk about what is a ketone ester versus the way that I drink ketones now? What is it? What's going on with that stuff?

Dr. Veech: Well, as you'd know, ketone bodies are an acid. They are beta-hydroxybutyric acid. If you're fasting during the day, you make 150 grams of ketone body. That means if I gave it to you as the acid, I'd be giving you 150 moles of acid. Well, that's a little bit too much.

Dave: Yep.

Dr. Veech: If I gave it to you as a sodium salt, I'd be giving you 150 grams of sodium. Now you're cardiologist would shoot me. You're allowed to have 3 grams, I'm going to give you 150 grams. The only thing you can do is give you a beta-hydroxybutyrate with a compound called one-three butane dial of a proper isomeric structure, the ar form and join the two together where they hydrolyze it in the body. You can get by without either you excess acid load or increase salt load. That's what we've done. Now, the next question is how to make that cheaply?

Dave: That was the problem. Stuff was like \$30,000 a pound, the way I was making that.

Dr. Veech: I know that. You can't go to the drug companies, they're used to make pills. You really must go to the agricultural producers. This is a food and so you must produce it not only can you not go to Korea or Japan or India to buy the pre-cursors because you don't know what you're getting. If you remember the story of tryptophan?

Dave: Yes.

Dr. Veech: The Eosinophilia–myalgia, MIT killed 47 people with that stuff. You really cannot use that. If you start with glucose in corn or sugar cane, you know what you're starting with and you know what you're going to get out. You also have the capacity to supply ... Let's say you want to supply 5 million Alzheimer's patients, you would break the government. You must get the price down.

Dave: Yep.

Dr. Veech: Way way way done. The only way you can do this is with a tank, car quantities. This is not a pharmaceutical.

Dave: That's exactly my point with the brain octane. I want to put that stuff out there. Anything I can do to get it more affordable because it's the most important thing I know but you're telling me there may be another way to do this which is why I'm super excited.

Dr. Veech: Yeah.

Dave: How do I get tank or cars of ketone esters? Are we that close?

Dr. Veech: Yes.



- Dave: Okay.
- Dr. Veech: We know how to do that. There are men that know how to do it. They are chemical engineers, I'm not a chemical engineer but they make tank, car loads of this stuff. Right now, they're making ethmo, which is worthless.
- Dave: Yeah, a waste of corn.
- Dr. Veech: That's right. They're making high fructose corn syrup, which just makes people obese.
- Dave: We can turn that same corn that we're basically destroying our soil to make corn, we could take that corn and instead of turning it into diabetes ...
- Dr. Veech: You could make ketone esters.
- Dave: For people listening to this right now, if you understand the implications we're talking about, you should be pissed off.
- Dr. Veech: A little bit.
- Dave: Yeah.
- Dr. Veech: Yes, but businessmen are mainly motivated by profit. They're also extremely cautious. When you tell them something new, the ketone body, the Delta G of ATP, they have no idea what you're talking about, absolutely none. They just don't know. Eventually, this is going to have to be done because the government can't afford ... It cost \$80,000 a year to keep Alzheimer's patient in diagnose. The government can't afford that. Even the government can't afford this. We're going to have to do this.
- Dave: The interview with Mary Newport on Bulletproof radio, I think she was number 47, if I remember it, we're at around 300, so this is a while, she was just talking straight up how she worked with her husband. Either you have it or you go on a ketosis diet, you increase ketones in the body however you need to and then you don't have the symptoms of Alzheimer's. My grandmother, who worked on the Manhattan Project, she is 94. If I can get ketones into her body as she uses brain octane stuff, she watches calculus videos on Youtube for fun. That's awesome. When she doesn't have that stuff, she is not herself. She is at the retirement community, it doesn't do what she would normally do. I value that. I think it's important.
- Dr. Veech: Absolutely. Newport is right. This guy couldn't live without many ... He could go about ... Well, she has written about it in the paper.
- Dave: Yeah.
- Dr. Veech: You improve behavior the same is true with Parkinsons. Parkisons, it's easier to see because a Parkisonian, many of them have just terrible tremors.

Dave: Right.

Dr. Veech: Well, these tremors go away.

Dave: That's where ketones turnoff the tremors in Parkinsons. They turnoff a lot of the brain deactivation in Alzheimer's you're saying?

Dr. Veech: Yes. Yes.

Dave: What about ALS? I have a good friend that ...

Dr. Veech: We would like to treat that. The problem with that, it's like Parkinsons. It's a free radical caused disease. If you start treating an ALS patient, and he gets better, let's say you get him off his oxygen tube, you can't stop. We could make enough ketone ester to treat Mary Newport's husband, one patient. Unless we get industrial collaboration, so there is no way we can start ALS until I've got a firm supply because you can't go back and say, "Well, Mr. Jones, you did a lot better. We're going to put your tray tube back in."

Dave: Yeah, they're not going to go for that. One of the things that is ... There are correlations with all these, especially ALS is neuro-toxin exposure that is mitochondrial poison. These are environmental things made by mother nature or made by us but they inhibit mitochondrial respiration. Then people get sick. They are the fat soluble toxins, and they mostly come from either algae or toxic mold. I know in my case, a lot of my symptoms, I grew up in a basement with *Stachybotrys* which inhibits mitochondrial respiration. Okay, I did a documentary about the dangers of water damaged buildings. I see correlations all the time. With ALS ver specifically, the algae derive toxins. But if you can fix mitochondria by using ketones instead of using glucose, you bypass the damage part of them.

When I go out of ketosis, when I stop using brain octane, I don't have at least 0.5 in my blood, my brain doesn't work the way it does now. Every single day, I do Bulletproof coffee, every single day, I do not too much sugar because I lose my ability to function the way I do now. I'm not going to go back to that but I think I have some maybe permanent damage to my mitochondria from toxin exposure. I think our friends with ALS are dealing with something similar.

Dr. Veech: Yeah. For reasons, I said, we haven't even ...

Dave: You haven't even got on ...

Dr. Veech: You can't ... Well, I mean, I'd love to do it but until we have a couple of tons in the backroom, I can't do it.

Dave: Maybe there is a way to help. If I can, I will. We can talk about that after the show. This is important to, not even just the countries, the countries but the whole world. We have so many people who are ageing, this isn't the problem we can ignore. I don't think it's a problem that drug companies can solve because if they try and solve it with drugs, no one can afford it. It's

got to be a food-based thing. It looks like you've got something pretty special here. Let's talk about it a little bit more. What about ketone salts? There's companies making ketone salts. We talked a little bit about how you don't have to have huge amounts of sodium but you get magnesium and potassium and things like that. What happens if you try and use ketone salts to maintain ketosis?

Dr. Veech: Well, you can't give that much magnesium and so you end up ...

Dave: Disaster pants.

Dr. Veech: Yeah. You get too much salt and your calcium and potassium will kill you. You really have to have sodium. The advantage of ketone salts if they have a very good taste. The problem is you can't get adequate levels, the K M to get in the brain is 5 millimolar. You'd be lucky to get .1 with the ketone salts. Furthermore, the ketone salts that are being sold are racemic mixtures. They're not ... The only ketone that's effective is the D-form. The DL is completely different, it metabolized in beta-oxidation. It's actually harmful. You can't ... It's dumb for convenience of manufacturing. It's cheaper to use the racemic salt. Well, fine, but the effects are not only not true, but could be harmful.

Dave: For listeners right now, in biology, there are basically different shapes of molecules. One is a mirror image of molecule. When our bodies make stuff, they make one image. When we make it in a chemistry lab, half of them are the natural image and half of them are mirror images. If you take the mix of those two, it has a different effect than if you use only the natural one. Dr. Veech is saying here is that basically, you're using a mirror image of the ketone salt that would be helpful. That's a problem. For manufacturers like me who make supplements and foods, it is much more expensive to filter out so you'll only get the natural ones and you throw away or recycle the ones that are unnatural even though they might be harmful, they might not be harmful but they get in the way.

Dr. Veech: Yeah, well, when you hold up your hands, you're giving the perfect illustration. Those are racemic, those are raceme. They're mirror images of each other. The body will use one but not use the other or if it uses the other, it will use it in a pathway which is different than this pathway and you may get unwanted consequences from using this pathway versus that pathway. In general, using racemic, it's an extremely rare compound where racemites can be used, the body is definitely very candid.

Dave: You're recommendation then, and I don't put words in your mouth, so tell the exact me this exact recommendation is that people don't use ketone salts?

Dr. Veech: Yes. No, don't use them.

Dave: All right, that's ...

Dr. Veech: You can get a high enough level and they don't tell you what they are. They don't tell you what's the D or the L. They say just say beta-hydroxybutyrate. Well, fine. The answer is no, those are on-sale and you can buy them. My recommendation is don't touch about the 10-foot pole.



- Dave: Okay. I've certainly tried various ones. I do feel a little bit of energy but I also feel usually a bit of a headache and I've seen some studies on liver function that were concerning. Is that something you pay attention to?
- Dr. Veech: Yes, of course. We're testing it again but it's my impression that you could actually precipitate Parkinsonian crisis by giving these racemic salts. In other words, you're interfering with the metabolism of the D-form. You're interfering the penetration of the D into of the brain. They're competing for the monocarboxylate transport. You're inhibiting that and you're also metabolizing the isomeric form through beta-oxidation which if you go back, reduces Q, which is not what I want to do. I wanted to oxidize.
- Dave: Wow. Okay, that's pretty scary. The ketone salt is all a front. If a company came out with one that was only the D-form, what would you say?
- Dr. Veech: Wow. How high can it get?
- Dave: You're saying there will just be too much salt and not enough ketone?
- Dr. Veech: Yeah.
- Dave: Okay.
- Dr. Veech: Right.
- Dave: I hear what you're saying there. You might get a slight bump but let's talk about salt then because if you are in ketosis because you're eating, say like the Bulletproof diet, where you're going to ketosis much of the time but not all the time. How much extra salt do you actual really need?
- Dr. Veech: Well, you don't need all that much. What you do need is potassium citrate. You need to supplement that because when you're ketonic, you decrease the urinary excretion of uric acid. If you're in ketosis for quite a while, you can elevate your uric acid and actually precipitate gout. It would be a good idea if you're ketotic either from your Bulletproof or any other means, that you go to a vitamin shop and buy 50mg capsules of potassium citrate and eat those because that will allow the kidney to excrete the uric acid.
- Dave: How much potassium citrate for the average person would you recommend?
- Dr. Veech: 50g maybe once or twice a day.
- Dave: You mean milligrams right?
- Dr. Veech: Is it milligrams? Oh, all right.
- Dave: Yeah.



Dr. Veech: Where is my bottle ...

Dave: They only sell 99mg capsules of most places

Dr. Veech: I said 50mg but that ...

Dave: Okay, cool.

Dr. Veech: Are you sure? Is that right? Yeah, all right. Bill says it's right.

Dave: Okay, cool.

Dr. Veech: I got to a little slip up I slipped both hands.

Dave: That happens to me a lot. That's a normal science thing. I think that's why the Hubble telescope didn't work the first time because that was unit conversions but anyway ...

Dr. Veech: Yeah, well so, but that's the only salt that I think you need. Not everyone needs it, particularly males are more subjected to gout, so females might not. But you need. If you're going to get ketonic, you need to periodically watch your uric acid.

Dave: Yep. You can do that with a urinary test strip.

Dr. Veech: Yeah, for uric acid, that's right.

Dave: Now, what's your favorite test for ketone levels?

Dr. Veech: Only the blood test matters. Urine tests are worthless.

Dave: Why are they worthless? I mean, they're not nearly as accurate but they're better than nothing, aren't they?

Dr. Veech: No.

Dave: No? I love how blunt you are. Okay. Why are they not better than nothing?

Dr. Veech: Because they don't tell you at all what the blood level is. They just tell you how much is in the urine. One is made by Abbott, it's called Precision Extra.

Dave: Yeah, I have that, Accu-Track.

Dr. Veech: Nova, there is a Nova. Frank thinks it's good but I calibrated the Precision Extra and it calibrates pretty good down to .2 millimolar but I ... He thinks the other is pretty good. The other advantage to the second form, the Nova is it's cheaper.

- Dave: I haven't tried that one but my Precision Extra one, I literally ... I did this test, and granted n equals 1 and not well-controlled but I'm a bio-acc, what I'm doing is the most important thing.
- Dr. Veech: Yeah, so I think you should test that, absolutely.
- Dave: I did. I ate a pound of sushi of white rice for dinner, get out of ketosis, right. Next morning, empty stomach, fasted, from dinner before. I had put two tablespoons of brain octane, a table spoon of butter and I blended up my Bulletproof coffee. I drank it a half hour later, .6, right.
- Dr. Veech: That's very good.
- Dave: That was enough for me to go, "Okay. My hunger is turned off." Then the CCK and the ghrelin numbers changed. That's not nutritional ketosis though, that's only .6; you can go up to 7.0, I'm a 10% of that. But that much matters for me.
- Dr. Veech: It depends what you're trying to treat.
- Dave: What are the different levels? What matters?
- Dr. Veech: If you're trying to treat Alzheimer's, I would go to 5.
- Dave: The higher is better, okay.
- Dr. Veech: If you're trying to Parkinsons, I've got a sick guy with 16 years of Parkinsons. He gets ... His tremor stopped at .3.
- Dave: Wow that low, .3, okay. That's relatively achievable.
- Dr. Veech: It's amazing.
- Dave: If I can get someone to .3 with the existing stuff on the market, I'm not very good at what I'm doing.
- Dr. Veech: That's right. It will ruin your business but that's all right.
- Dave: I'm just saying it's good, .3 is so easy.
- Dr. Veech: He in fact uses a formula, which if that's one of you ...
- Dave: That just makes me to hear that, that people are benefiting that way.
- Dr. Veech: He is on maximum Parkinsons med. He is on dopacarbodopa, an NAO inhibitor, MCOT inhibitor. He is here if you want to talk to him.
- Dave: Oh my god. That's incredible.



- Dr. Veech: Come over here, Bill. He has had 16 years of Parkinsons. When he came to the lab, he called me a year or so ago and said he wanted something. I said, "No, I can't do anything. I can't do anything for you. We don't have enough stuff, go way."
- Dave: Oh, no. Hey Bill.
- Dr. Veech: He kept coming back and after he went to the corner of the lab and jumped up and down because he had spasm and he shaped like a leaf and ...
- Dave: Wow. You're 16 years of Parkinsons?
- Dr. Veech: Yeah. Well, tell him and that ...
- Bill: Well, it's been since 2000. Can you hear me?
- Dave: Yeah, I can hear you. You're using all the Parkinsons meds and you're using mild ketosis or maybe deep ketosis?
- Bill: I would be in Dr. Veech's lab and I'd go stand in a corner, jump up and down, try to do anything to get rid of my distonia. I had a whole lot of trouble concentrating. I had to have somebody drive me to his lab. He got tired of me just having all these symptoms. He had received an e-mail from Dr. Siefred, is that who ...?
- Dr. Veech: Yeah, Siefred.
- Bill: He was saying, "You know, if you try this Bulletproof coffee recipe with the Kerrygold butter and the cream and the Stevia and the coconut oil.
- Dave: Yeah, the brain octane oil probably or are you doing just plain coconut oil?
- Bill: Well, Siefred did the recipe with coconut oil.
- Dave: Got it. Basically it's a coffee, the fattening, got it. Okay.
- Bill: Yeah, I tried that. I kept track of all of my symptoms. Every hour and I would ask myself the question, "Did I have this symptom in the past hour?" At the end of the first day on that coffee, I looked back and I crossed about 8 different symptoms. There was only one that it didn't pretty much helped thoroughly.
- Dave: Yeah.
- Bill: That was the dyskinesia, that's caused by the medicine.
- Dave: I guess you're still using that today?
- Bill: Yes. I have started taking more of the MCT with it.

- Dave: Let me send you some of the brain octane because we've got a study that's coming out. It hasn't been published yet but it appears to do about three times to five times more ketone production than you'd get from coconut oil or MCTs. That's why I had put it in the official Bulletproof Coffee recipe. The numbers show there but I'll send you a bottle of that just to try because I'm stoked to see anyone who has had Parkinsons for 16 years who is using a higher fat ketosis generating thing. Let me see if I can give you a little boost there.
- Bill: That's great.
- Dave: Well, congratulations on your success. That's amazing. What an incredible outcome. I'm blown away. It's so cool. Let's see. What else was I going to ask you? Okay, without the ketone ester form that you're working on and the one that I figured that was \$30,000 a pound the way I was trying to make it.
- Dr. Veech: Yeah.
- Dave: That's why I had one dose of it because I'm not made out of money, right? What can people do today to raise their ketone levels? What do you recommend if someone comes to you and says, "I have a metabolic problem or just I want to be an athlete. How do I get my ketones up?"
- Dr. Veech: Well, I'd probably tell them what I told Bill, "Go away. I don't have ..." He came to the lab so I had to. He wouldn't go away.
- Dave: Yeah.
- Dr. Veech: What we really need to do is what you said, we need to get pro-do-xin. The problem with recommending a high fat diet is that certain patients will get increase blood cholesterols or increase LDL. The last thing you want to do is precipitate a monocarbon function some of these, for instance, at NHI, you treat epileptics with a high fat diet. They won't give a high fat diet to any patient over 70-year of age. They won't do it for fear of cardiac complications
- Dave: That seems a bit ridiculous given some of the newer science coming out. I mean, Mark Highmond, Cleveland Clinic. There is so many big things coming out saying, "Depends on the kind of fat, depends on what else is in the fat. Is that fat damaged?"
- Dr. Veech: I can send you the paper from John Hopkins from Friedrich. That's the Mayo Diet that says that you elevate the cholesterol. When the cardiologists hear that, you can put all the papers you want to, they don't want to hear you.
- Dave: Yeah, they don't want to hear you. The newer papers are saying that cholesterol is not what they thought it was.
- Dr. Veech: Well, I could agree with that but I would simply say that you don't want to willy-nilly ways people's ketones by fat without keeping an eye on their blood lipids.



Dave: And their inflammation too, right?

Dr. Veech: Yeah, that's right. The current country runs on stock news.

Dave: Yep.

Dr. Veech: You're not going to change that. Cholesterol is a bad thing whether it actually is or not.

Dave: What I found is that when people go on the specific Bulletproof diet which is a set of protocols, it's not a product-based thing, it's a lifestyle, that they're increasing specific kinds of fat but not all fats. They're avoiding canola, they're avoiding the Omega 6's that cause arachidonic acid and other inflammatory things. They're not deep frying anything the way Atkins would have allowed. You're not getting damaged fats. When they do that, and they avoid certain other inflammatory compounds and foods, mostly protective elements in plants that are hard on us, that their cholesterol levels may go up, they may stay the same, they may go down, but very predictably triglycerides plummet when you do this. You're not eating fructose, so triglycerides go down. That's pretty easy to understand.

The markers that I pay the most attention, homocysteine, psoriatic protein and LPPAL2 which is a marker of damage at the arteries. Those guys drop. If they don't, we have a methylation problem that you can address with other things. In a majority of people, that's what I expect to see. If you're doing your labs, you have no idea what you're fast is doing to you. You have no idea if the diet is working. If you do your labs, where the problem is now, if inflammation is most important, we drop the inflammation, everybody wins. If cholesterol is most important, if it did go up, if you're one of those people where it does go up and stay up, a lot of people goes up and drops, okay, then what do you do? My inflammation just dropped and my cholesterol is up, which one is most important?

In my world, inflammation is most important. If I can't see any damage to my arteries, then I'm probably not going to have a mitochondrial infarction. Then there is a debate this. It's very fair to say, that's a framework of the that I work with.

Dr. Veech: Your problem is you know too much biochemistry and the doctors do just certain tests and they don't think about homocysteine or ... You're not preaching to the choir. You're preaching to a band.

Dave: Okay.

Dr. Veech: All of the things you mentioned about inflammation and the psoriatic protein are of course extremely important but those aren't ... A merch ...

Dave: Yeah, they're not mainstream.

Dr. Veech: Makes money selling statins. They push statins forever.

Dave: It's true. What I'm looking at is because the Bulletproof diet has sold a couple of 100,000

copies and it's in four languages, I feel very solid in my science. I live in this stuff. My wife, my kids, my whole family, we all do this. I track the numbers and I believe it. I don't want to be self-deceptively believing anything. Anytime I get a chance to talk with someone who has actually worked with Krebs, if you poked holes in that theory, I'll tell people about those holes because I believe it's really important. We can do this without drugs. We can use drugs selectively. Drugs are not a bad thing. They can save lives. They have saved lives. They have also taken lives, just like food poisoning has taken lives. Food isn't good or bad because some people die from it. I don't want us using drugs when we should be using food. That was just a bio-hack.

Dr. Veech: Certain things you can do only with ... I don't call them food, I call them substrates. There are certain substrates that are essential. It's not easy. I don't know a way I could make those changes in mitochondrial energy production by using pharmacologic agents. I can only do it by changing substrates.

Dave: Well, in my world, as someone who had I believe mitochondrial damage, a lot of metabolic dysregulation and inflammation and just autoimmune conditions, Lyme disease, fibromyalgia, chronic fatigue syndrome, all those things, I've had mercury poisoning. To be sitting here today, I do everything that I can find in a paper that says it's going to increase my mitochondrial function. I do infrared light stimulation, UV exposure, all sorts of weird stuff, cryotherapy. Basically, I stack everything in my favor because I plan to live a long time and I like to feel good. Very few people do that and I have to say, the number one thing that's maybe the biggest difference in my energy is getting my ketone levels up. Not up to 7, I've only done that a few times, but just up. I'm also not treating one of the diseases that you're treating, that stuff. I'm just looking for it. You gave me the number, the number is 28%. I think earlier, we were saying 38, but it's not, it's 28% .

Dr. Veech: Yeah. That's right.

Dave: I do. Now that I hear that number, I remember looking, something about number of electrons, it goes way back into the early days of when I was reading about, something about the number of ... The amount of calories per gram of fats versus calories per gram of carbs. When you eat a gram of something, there is more energy in fat. We're saying is from ketones specifically, there is a different effect that's 28%.

Dr. Veech: When you eat fat, it's true, diesel oil has more calories per gram than sugar.

Dave: Yep.

Dr. Veech: However, when you're burning fat, you're going through beta-oxidation. One reducing equivalent goes to NAD and one goes to plavo protein. You've already lost 1/3 of your ATP in that step. Go back to your lenature, beta-oxidation, you do one NADH, you do one NADH, you do one plavo protein. You do that to keep from blowing the mitochondria up.

Dave: Physically blowing it up, right.

Dr. Veech: Well, just too much energy.

Dave: Right.

Dr. Veech: You're running, you're running the voltage across your mitochondrial membrane for four electrons is about 140 to 160 millivolts. If you got it up to 180, you would hear a bunch of pops, like popping a condenser, you can't put that much voltage across a mito .... It's only a lypoprotein membrane.

Dave: Yeah.

Dr. Veech: You can't put that much voltage across it. It will blow up.

Dave: It's like a car. If you're running nitrous oxide and you drive a car, you're going to blow a gas get somewhere.

Dr. Veech: That's right.

Dave: Is there a risk of this? This is something I have asked myself when I go to sleep at night. I didn't actually spend any time worrying I've hacked that. I think about stuff and if I've maximized my mitochondrial function so they burn cleanly and I've basically moved the ratio so that I'm making the most energy I can. One perspective is that I'm going to wear them out. The other one is and the one I favor, but I don't have great data on this, is that I'm less likely to get cancer when my mitochondrial running at maximum capacity. I'll probably live longer. Am I making a fundamental error there?

Dr. Veech: I think so.

Dave: Okay. I appreciate your perspective on that because some of this is unknown. I don't know anyone who spent 40 or 100 years of their life in mild ketosis pretty much every single day. That's what I'm going to be doing. I've been doing it for the last 10 years. I'm not stopping.

Dr. Veech: Frank Yosa He is quite interested in making himself ketotic. He can give ...

Dave: Who is this? I must have missed one before that.

Dr. Veech: Frank Yosa. You've spoken to him about a lot of your systems. He can get ketone levels all up to 8, which is ... That's high enough.

Dave: He got up to 8 and he is doing that just with fat or ...? How is he doing that? Hey Frank.

Dr. Veech: Here, Frank.

Frank: My family is vegan. We don't need to go into debate on that.

Dave: I know. There is no need. There is no need on a debate on that.

- Frank: I use the Bulletproof C8 in the morning. I was experimenting with different amounts of MCT8 with coconut oil, seeing how high I could go and seeing if doing it after an overnight fast. I was down in the 1 and the 2's, he was freaking out, "How are you able to do that?" If I'm tweaking it. The other day, I sent them a message saying, "Hey, my ketone meter has something nice it wants to say. Hi." We maxed it out, 8. He goes, "Go eat an apple." I ate half of a pear to bring it back down but I hit high twice. Right now, I'm probably 5.5. it's on a vegan diet. It can be done. It's not a ketogenic diet either. It's just ...
- Dave: You're not doing a low carb? So you're eating some rice and some salt?
- Frank: I'm absolutely doing low carbs.
- Dave: Doing lots of green vegetables and lots of brain octane basically?
- Frank: Yeah. I'm just removing bread, pasta, chips, just those basic ones that are often times a staple, just off the table. Then just a lot of avocado, Macadamia nuts, wall nuts, a lot of nuts. Coconut flakes is my favorite thing at night. If I really need something, it's got the crunch. I'm still eating hummus, black beans.
- Dave: Wow.
- Frank: Yeah.
- Dave: You're getting some carbs, okay.
- Frank: If I get a chip and I have to do a huge hummus on it, yeah. The hummus is still in there to ...
- Dave: You make the hummus yourself with brain octane in it or no?
- Frank: No, I do. My first experiment was just the morning and then checking my levels at different intervals afterward. Then now, I've started actually in just a squirt of it at lunch, just a squirt of it at dinner time. I used to be conked out. I'd put the kids to bed at 8PM and you'd lay down with them. It's like I'm out and then it messes up my entire sleep. Then with the MCT, it's been a noticeable different, I'm not conked out at 9:00.
- Dave: There are more than a few vegans using brain octane. I was a raw vegan for a while. By the way, people like to think I like to hate on vegans. I don't. I've been a vegan. I want to not kill animals. I just want healthy soil and all that stuff. Yeah, if you're going to be a vegan, I think having some ketosis involved, like masses of avocados and macadamias ... A lot of what I was eating when I was a raw vegan, wasn't fully ketosis but I was like, "I'm going to die if I don't get fat," because my metabolism was wrecked. It's amazing that you've hit 8. You're the highest ketone vegan that I've met so far. Congratulations.
- Frank: The one trick that I found was ... Because obviously, there is a GI problem with the MCT8, you could take a little bit too much. I've been able to get up to 4 tablespoons at one time with 1 tablespoon of coconut. I found that the moment, exactly 22 minutes later, I feel a twinge in my

stomach. I take 5 macadamia nuts and it goes away.

Dave: The reason that I recommend not blending just brain octane in coffee is that it causes GI distress. If you put another fat with it, it solves the problem. Butter is the other fat, yeah.

Frank: I did the 4C8 oil. We can't do the butter because I'm a vegan.

Dave: Yeah, that's right. Right.

Frank: I did the 4C8 and one coconut oil. That was a little bit of the longer. Then the macadamia nuts 22 minutes later, the moment that I start ... Because otherwise, I was running to the bathroom and who can get to the bathroom faster?

Dave: Four tablespoons of brain octane is a lot.

Frank: No, no, I'm now down to one or two; one or two now, yeah. He made me get cholesterol levels. He kept on yelling at me saying, "Get your cholesterol checked." It just came back 105.

Dave: 105, that's a little too low. Do you have any testosterone in it?

Frank: Avail LDL down.

Dave: Avail LDL down? Okay, cool. That wasn't total. I was like, "Man, you're going to die, okay."

Frank: No, no, no, so.

Dave: Wow. Well, congratulations. You're doing something right. One thing about the brain octane versus MCT, MCT especially the 10, is very disaster pants promoting. When you get to just the 8, you can tolerate a lot more of that and you get more ketones per unit. The increased bowel tolerance and the increased ketone levels equals, okay, that's why it's in there. I would tell people, "It's just coconut oil," if it worked. Right?

Frank: Yeah, the C8 is more expensive but if you're actually breaking it down per ketone, it's probably cheaper.

Dave: It is cheaper per ketone.

Frank: You'd have to take two to three times as much just kick ... So that's my point.

Dave: Yeah. I get all pissed off from people who are selling lauric acid as an MCT because it doesn't actually raise ketones the way actually biological MCTs do. That's a whole other debate so ...

Dr. Veech: All right. I'd just like to say one thing that I wouldn't like a lot of what Frank ... Frank is smarter than the average brown bear. He also talks to me once everyday or two, and three monitors of level for the general public, what he is doing is probably not to be recommended.

- Dave: It's on the outer edge of experimentation, yeah.
- Dr. Veech: That's right. I watch it. I don't think there is any cure himself but I wouldn't want that to be put out as a general ...
- Dave: No, as a general ...
- Dr. Veech: A safer thing is get the ketone esters made, that should regulate them. You can eat what you want. He has a very extreme diet. He also knows a lot. He follows his diet so I wouldn't recommend what he ... It works, it works. He has shown me a lot of things I didn't believe could happen but I wouldn't want to recommend it.
- Dave: There is a role for bio-hacking where, "Okay, this is my belief system. These are my goals." Different people have different goals. If you're goal is, "I don't want to ever kill another animal," you got to make sure that all the vegetables that you ate didn't kill animals in their production, which is a harder thing to do. Okay, let's say, then you pursue that goal and you look at all the biological and metabolic effects. We might learn something new from that, and I support that 100% but I also wonder, right now, probably between a quarter and a half million people are going to hear this conversation and I would be bothered if a lot of them said, "I'm going to go on a central high fat vegan diet right now because it's a way to raise my ketones." There are many ways to raise your ketones. I'm not sure that I'd recommend that as the most anti-ageing long-term least inflammatory most studied way to do it. But here is an example of someone who pulled it off, right? That's cool.
- Dr. Veech: Remember, the first role of a doctor is do no harm. I really don't want to kill patients. I tell my students, "I don't mind killing the administrators, but I have a problem killing patients." I think that a little ... Frank is a bit extreme in what he is doing. He can do it but I don't know about anyone else. I've never seen anyone else do it. Let's put it that way.
- Dave: I've not heard of someone hitting those levels especially with carbs present but it's cool. He has got some tools. He is working on it. Now, we're coming up on the end of the interview. I felt like I could talk to you for another hour but ... There is a question I want to ask you. You might have some of the most interesting answers of anyone I have interviewed because I've asked every guest on the show this. Given all the things you've learned in your life, not just science but all the things you've learned, if someone came into your office tomorrow and said, "Dr. Veech, I want to perform better at everything I do as a human being. I want to kick more ass at life." What the three most important pieces of advice you have for me? What would you say?
- Dr. Veech: Well, number one, keep your weight down, don't get overweight. Two, exercise in moderation. I think the third thing is to enjoy yourself. I think a healthy attitude is a very desirable thing now. I think in the long run, maybe we'll come back and we'll wile and say, "You should perhaps be ketotic," but we don't have that evidence yet. That's for another edition.
- Dave: I love it that being ketotic wasn't one of your top three. That's really cool.
- Dr. Veech: No, no, no. I mean, it's very important but it has not been established that long and happy life



results in ketosis. It may be true but we have not shown that yet.

Dave: I will do my best to show an n equals 1 example of that because I feel so crappy when I'm not in mild ketosis, that I'm not willing to go there.

Dr. Veech: Yeah. Well, of course, the starvation, our construction was very popular. The man, I forget his name, but he was in California, he died ...

Dave: It wasn't Bill Falloon, he is still alive, right?

Dr. Veech: No. I forget his name, but he died about 72. It didn't ...

Dave: Didn't work.

Dr. Veech: Didn't work. As I said, if you look at the sum effects of ketone ester and cholesterol and blood sugar on inflammation, on energy, on cerebral function, in general strength, you're talking about many of the hallmarks of the phenotypes of the ageing, particularly the free radical.

Dave: This is profound stuff. I've had an amazing time, learned a couple of things I didn't know about particularly around the salt levels and ketone salts and around the radioactive free radical protective effects of ketones in the body, particularly around radiation. These are things that I just didn't know about. I feel like I read all the papers but there you go. You actually do read all the papers then. Thanks for your work, Dr. Veech. You have 47 years of looking at this is remarkable. Is there something new on the rise after ketone esters? What's next for you?

Dr. Veech: Right now, our main problem is to get them to produce a quantity at a low price.

Dave: Well, I will support you on that. We're going to have a conversation afterwards about that and see if there is something I can do to move a needle for you. Thanks again for your work. I look forward to having you on the show again maybe a year or so when you've made some progress.

Dr. Veech: Thank you very much.

Dave: If you enjoyed today's show, you know what to do. Send it to a friend. Go on to iTunes and click like or give it a good review or whatever it is you do on iTunes, I forget there. Better yet, if you want actually see what Dr. Veech looks like and experience the video of this, head on over [bulletproofexec.com/youtube](http://bulletproofexec.com/youtube) and we'll hook you up with our Youtube channel so I'll let you know every time one of these things comes out on Youtube. I appreciate you listening. While you're at it, pick up an extra bottle of brain octane and some Bulletproof coffee beans, put it in your morning coffee, pour brain octane on your sushi the way I do, it tastes pretty good. Just get your ketones up a little bit. You might feel different if you do it, just saying. Have an awesome day.



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