

Announcer: Bulletproof Radio, a state of high performance.

Dave: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that a genetic scorecard now could predict your risk of being obese. Researchers looked at more than 2.1 million genetic variants, and created a genetic predisposition score that they think predicts whether you're likely to be severely obese.

Dave: In their study, they showed that weight differences came up as early as age three and by age 18, if you had the highest genetic score, you weighed about 29 pounds more, on average, than those at the lowest scores. If you had the highest score, you're also 25 times more likely to have severe obesity, and high scores were, sadly, associated with what you'd expect; increased risk of heart disease, diabetes, high blood pressure, and stroke.

Dave: A bunch of other people said, "Yeah right, that doesn't really matter." Because, you didn't account for lifestyle. For instance, maybe those genetic things are just your predisposition for French fries and gluten. Anyhow, what we've all learned from the world of biohacking is that the environment around you turns those genes on and off, and there's some genes environment that won't affect. Because whether they're on or off, they do a certain thing. For the most part you can change all that stuff and, take it from me going from 300 pounds to about 200 pounds depending on how much muscle I have at the time, I think you can overcome those genetic things. You just have to find out what works for you, it won't be the same thing that works for everyone but there's some basic rules you can follow.

Dave: Now, today's guest is a guy who runs the most popular and powerful online health site there is. He's been doing it since 1997, he's inspired many millions of people to look at the way they manage their lives, to look at their health, to pay attention to many of the things that we now take for granted in the world of functional medicine. He's an Osteopathic Physician, and just realized we can improve ourselves and has been fearless in talking about what works. I'm talking about none other than Dr. Joseph Mercola of famed mercola.com fame. He's a dear friend and just a great guy. Dr. Mercola, welcome to the show.

Dr. Mercola: Hey, it's so great to be with you today, Dave.

Dave: I'm recording this episode with Dr. Mercola because he just finished speaking at the 6th Annual Biohacking Conference. The conference is something that I started in San Francisco with 100 people, we had more than 1000 people this year at the conference, talking about stuff that works in the body. Dr. Mercola just completely rocked the audience by talking about some of the things that you've heard on the show. Things like hydrogen, things like EMFs, and other stuff like fasting and ketosis and things that you may know if you're a longtime listener and if not, Dr. Mercola is a world renowned expert on this stuff, and we're going to go deep today. Super happy you're back on the show, even though you're just offstage.

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Dr. Mercola: Well, I want to thank you so much for having me at the event. It was literally, the best event I ever had in my entire life.

Dave: Wow.

Dr. Mercola: Without any question, nothing can close. It was like putting 10 Christmases in one weekend, literally, and even that is an understatement. Literally, it changed my life in many ways. One of the biggest is I met Dr. Barry Morguelan. I'm actually committing to his program because of you.

Dave: Wow, Joe, that makes me so happy. I love it, you're going to try it. Joe, I have had results from that, that I cannot explain using with some medicine, but there's something going on there that's real. Now, you just wrote a book called Keto Fast where you talked about ketogenic stuff and also timing. This idea of maybe you don't want to eat after dark, we had Sasha Banks on the show. You put together a book based on your knowledge as a physician, and you're just deep research for decades. Maybe we start with what did you learn from writing Keto Fast?

Dr. Mercola: Well, my first book ... Or not my first book, I think I've written a dozen now. The previous book on this topic was Fat For Fuel, which describes a program to obtain metabolic flexibility and help teach your body to start re-burning fat for fuel. Most of your listeners are probably there already but, clearly, about 85% of the U.S. population is not, so it was somewhat targeted for the general population.

Dr. Mercola: After finishing that, and I wrote that after it was catalyzed by my journey in seeking to finally understand and integrate this in my own life. Then I was fascinated with the benefits of multiple day water fasting and at the time, before I committed to writing the book, or when I committed to it. I thought, that I would write the book about how to implement, successfully, a multiple day water fast, typically five days. Because I had done it three or four times before I did the book, and I thought this was really important to do.

Dr. Mercola: What I realized, after doing the research, is that there was probably not a good strategy for almost everyone. For a number of reasons. Well, there's a number of good reasons why it is beneficial and has been beneficial, historically, for many, many centuries. It probably for time immemorial, it's a crucial part of nearly every major religion on the planet, for spiritual reasons, but also for health reasons. You've got to know that practices like that would not persist, unless there was some benefit for them.

Dr. Mercola: There clearly is a benefit to doing this, but what I realized is that we live in the 20th century. In the 20th century ... 21st century, sorry. We used to live in the ... we live in the 21st century. In the 20th century, and certainly extending to the 21st, there was the development of all these toxins, industrial chemicals, at

least 80,000 and more. Many of them have never been studied for toxicity, let alone synergistic toxicity from having combinations of these things.

Dr. Mercola: Most of these chemicals are fat soluble, which means they eventually get stored in your fat cells, and when you're doing a multiple day water fast, you are liberating these toxic chemicals. That's all well and good unless you have too many of them, and your detoxification systems aren't up to the challenge of biochemically modifying those toxins so that they can be essentially changed, and effective, and eliminated and excreted from your body.

Dr. Mercola: When you do this multiple day water fast, I think you're getting too many because of the toxic exposures that we now have, and you're also don't have the fuel, and the nutrients you need for your liver properly process to them. Which is why I think Keto Fast or a partial fast, which is a hybrid of a few different systems. Krista Varady, Alternate Day Fast, she's a professor at the University of Illinois, maybe associate professor. Then, my Michael Mosley did the ... no, actually he did his thing too, the five too. But, it was also, Valter Longo's work onto the Fasting Mimicking Diet. I hybridize those together into a program that I thought is relatively easy and simple to understand and follow and yet reap the most important benefits that you would achieve by multiple day water fasting.

Dave: I love your mindset and we both think that way. It has to be something you're going to actually do because if it occurs, and you go to the top of the Himalayas and stand on one leg. Will you do it? The friction to get there isn't going to happen. The pragmatic approach to getting most of the benefits, but experiencing way less of the disruption in your life and the pain, that's the holy grail for people who actually have things we want to do. Walk me through how you do this multiple day variant on water fast. Then, I want to share with you and with listeners, what I've been doing and let's talk about the pros and cons of these different things.

Dr. Mercola: Well, like I said, it's a variant of the fasting mimicking diet, which is 1000 calories the first day and then a pod 700 calories the next four days. It's a little bit different than that, and it's all, and basically you're using your own food, so it's a lot less expensive than a \$600 ProLon Program. The way that you do is you first have to become metabolically flexible, and most people listening probably are, but if you aren't, then the single most important strategy. The one that I emphasize in every lecture I give now is to compress your eating window to six to eight hours.

Dr. Mercola: What I realized, actually as I was doing my own Keto fat question and answer session, is that we sleep for eight hours, Dave, right? Except for you six and a half hours with your massively improved stem cell make over that you're able to do that. Most of us, most every other mortal humans are sleeping for eight hours if they want to get their maximum benefits. Why shouldn't we just eat for eight hours and then 16 hours put it at rest? Now, I tend to go a little bit longer, not only eaten a six hour window, but maybe it's eight hours.

Dr. Mercola: Six to eight hours is the window, and once you're doing that, you really get, just doing that and not have been paying attention to the quality of the food is going to provide you with enormous benefits. If you're doing that, you're going to become metabolically flexible unless you're seriously metabolically impaired two, 300 pounds overweight or maybe even 100, then it's going to take a little longer. The way you know you're flexible is that you can look at your ketones, and the most accurate way is measuring them in your blood. When you're able to generate physiologically useful levels of ketones, which is usually about 0.3 to 0.5 milli moles, then you know you're flexible and then you can do this. What does the program?

Dave: By the way before we get into the program, some people might not know what that 0.3 to 0.5 is and the significance, I want to walk through that real quick.

Dr. Mercola: Sure.

Dave: Most of the Keto bro cultures, "My ketones are higher than yours. I got him up to 3.5 or whatever." Which, is like saying my blood glucose is higher than yours. The fact you have all these energy molecules floating around that your body didn't suck into your cells might mean that you have a problem. But 0.3 to 0.5 is not considered nutritional ketosis by most people, but it has these massive effects on hunger hormones and it has these other effects on your satiety hormones. There's a couple of different studies that are in both my books. I think, you also have the same research in your last book, if I remember right. That's a magic number and you can get there via a variety of ways. All right, so given that context, this is low grade Ketosis, this isn't like the monster ketosis, that already have.

Dr. Mercola: No, no, it doesn't have to be that. That's a very good point that you bring up date because Dave, there are some challenges with that. As you become more metabolically efficient, your tissues and they're able to utilize those ketones. You suck them up and they're not floating around in your blood. Actually, your blood ketones will have lower levels and it doesn't necessarily mean it's worse. It's very, very hard for me to get my ketones over three. I have to fast for many days to do that. I typically don't fast for more than a day. Well, the Keto Fast, which I'm about to describe, but even when I take like 50 grams of exogenous ketone esters, it hardly-

Dave: Have to tastes like gasoline, right?

Dr. Mercola: Yeah. Anyway, you get your metabolically flexible as determined by blood ketone level 0.3 or 0.5. You've got this restricted eating window, in my case, it's 9:00 AM to 3:00 PM, maybe it's 10 to four, 10 to five, it's in that range. You've done it, you've eaten, you've been doing this for a month and you wake up, and then you get to 9:00 in the morning and render eating time is, and you would normally eat your regular meal. Instead of eating your irregular meal, you have a very small meal. It's usually between three to 500 calories based on your lean

body mass, which is about 3.5 times your lean body mass. Those calories are very specific calories, and I think this is the key.

Dr. Mercola: First of all, there's low carbohydrates, very low carbohydrates to inhibit autophagy. Less than 10 grams, essentially none almost. Then, the fats are actually low too, but it's only low because you want to keep the calories low because high calories will inhibit autophagy. The bulk of the calories though by volume certainly is protein, but it's a very specific type of protein. It may be 30, 40, or maybe even a little more grams of protein, which is quite significant. I think, it's useful because it's going to give the fuel that your liver primarily requires to facilitate the detoxification process.

Dr. Mercola: The proteins are really low levels of branch chain amino acids. A good example of that would be collagen protein or bone broth. Which has a lot, mostly glycine, proline, hydroxyproline, very low branch chains. It's almost an ideal form, and I use fermented Chlorella, which is not, doesn't have the glycine, but it's still is low in the branch chain. We have a vegan protein powder that I use also, which is also very low and branch chains.

Dr. Mercola: I have 40 grams of that one meal and that's the meal for the day. Then you don't eat for 24 hours. Essentially, the next day you wake up, and it'll be like 4:00, by the time you read the next meal, you'll be at least 42 hours where you've only had three to 500 calories. There are a number of things will occur in that, they're physiologically significant. One, is that you will maximally activate Autophagy, maybe not actually, but close to two Max maybe 85%. Because, you'll get probably getting more and multiple day water fast, but not significantly more, especially considering the downsides.

Dr. Mercola: A few other things will happen, typically you'll lose weight. I lose about four pounds of weight every time I do it. Most of all its water because you're depleting your glycogen stores, and your glycogen requires water to be stored. When you're burning it, you're going to urinate the water, and you're going to lose weight. It's not lean muscle mass you're losing, it's primarily water. But, then you'll also have increased radically increased your growth hormone levels by two to 300%. Which is a profoundly important physiological benefit that you can absolutely take advantage.

Dave: It that the collage or the fast that's doing that?

Dr. Mercola: Well, it's the fast. It's the fast. That's an artifact of fasting there's a lot of other good things. Which is, DPA representing NAD plus, and I can tell you about the mechanisms you're interested. Anyway, so your growth hormone is elevated, it is not typically a problem, it's not like injecting growth hormone because when your growth hormone is elevated from fasting, your growth hormone receptors are inhibited. You don't get the act of ... you don't get the increase in IGF-1, but you still have elevated growth hormone so that when you wake up in the morning, you can do a strength training workout, and you can just crush it. Absolutely, crush it in a fasted state.

Dr. Mercola: Then, when you get home, or when you're finished with your workout, as soon as you can, then you feast, and you activate enter. You go to an anabolic phase where you have lots of branch chain amino acids, glutamine, colostrum, things that would really build your tissue up and carbohydrates. Carbohydrates, healthy carbohydrates like fruit will raise your Insulin levels, decreased MAPK they'll activate mTOR, and the branch chains will say export. Because, there's a number of different ways you can activate mTOR, you just don't want to do it with one way do with multiple ways net then you can get maximal.

Dave: I wrote about mTOR, I called it either stalking mTOR or tripling down on mTOR. Because, the way mTOR works and you want mTOR to build muscle tissues. This is for people listening, if you haven't heard about mTOR, you need it in order to build muscle. But, if it's chronically elevated by eating too much animal protein all the time, you're not going to like what happens. It's really bad for you. It should be low most of the time, and then spike, you get muscles and then it goes back to low. That's what Dr. Mercola is talking about here. The three things that work to really mTOR down. All you want to do is push it down, it's like a spring. You load it up, you load it up, you load up, and then you let the spring go and it spikes.

Dave: Fasting suppresses mTOR swivels back, back up. Coffee is shown in studies to suppress mTOR and exercise does that. What Dr. Mercola is describing here is, it is very similar to that idea of a tripling down on your mTOR, and you do all those things and working out in a fasted state. The way he just said it, it's profound because I would say, before the workout, have some coffee. If you guys might know.

Dr. Mercola: Absolutely, I didn't get to that part, but I'll explain that.

Dave: You didn't know you have that in there as well. Then bam, the mTOR goes up and you do put muscle on better. I love, you mentioned glutamine, but glutamine will take you right out of Ketosis, right?

Dr. Mercola: Well, yeah, but do you do this after the workout.

Dave: Exactly. You're okay to go out of Ketosis because you've just worked out, right?

Dr. Mercola: All the supplements I said glutamine, branched chain amino acids, fruit. You don't do those in the fasting phase, you do those after you've worked out. You're absolutely right, coffee is so beneficial because it's full of polyphenols. Now healthy coffee of course, because you don't want to toxins and the new promoting full of Mycotoxin and other things. There're other polyphenols knows like rocking alternatives, E-G-C-G from green tea. I use a wild apple that's harvested from Europe, is it as much even higher concentrations of EGC and other similar polyphenols. Then, I like the pomegranate peels, most people know pomegranates are healthy, but the peels actually has 90% of the polyphenols. There's two really good ones in there, ellagic acid and ellagitannins

and when you eat them, your microbiome converts them to Urolithin-A, which is a powerful, powerful, autophagy benefit. These pomegranate peel powders are some of the most profound polyphenols out there in my view.

Dave: What's really cool, you can get a Viome test. Naveen Jain was also on stage at Bulletproof Conference and he found that about 30% of people don't have the bacteria in their gut to metabolize ellagic acid, which comes from pomegranates or from raspberries. If you have that test, it actually tells you whether you're going to be able to convert that. I would imagine, although we don't have the evidence yet, that if you take that stuff regularly, you'll actually grow the microbiome that can do that, which is also interesting. If it was never present your diet, why would you have bacteria that could do it? This is one of those ways, you change your gut bacteria to be healthy if you take that stuff regularly. I like the apple polyphenols as well.

Dave: These are important things and you're bringing up something that annoys me about fasting. There are some purists who say, "Well, the lab studies on rats were done with water only name. Therefore, we can only do water in our fast." Here's the thing, this is in the board of diet in 2014. Let me call it Fasting Induced Adipose Factor or FIAF. Your liver makes this stuff, and when you're fasting it says, "Burn extra fat." When you have extra carbs present it says, "Store extra fat." Unfortunately, your microbiome wants to make sure that the walking Petri dish that is you from your guts perspective. It wants to make sure that you have extra fat and that you're not going to run out of energy. It'll amplify your FIAF levels, and what does the good bacteria in the gut eat? The stuff that keeps you this, it is polyphenols.

Dave: I don't know, but when I'm doing my "water fast", do I want to have green tea? Do I want to have coffee? Do I don't have polyphenols that don't have substantial amounts of carbohydrates or protein present? I think, that there's a great argument for it and I feel better and perform better when I do it, so I love it that you're calling that out too. Because water only fasting isn't necessary, it's better to do it with tea or coffee or Krakow even, than not.

Dr. Mercola: Small amounts of protein does not go to activate it. That's the conclusion I reached out to review literature. It's really clear if you seriously investigate this, but there're other polyphenols too. You've got Curcumin, you've got Berberine, Poinetin, and there's probably another half a dozen I'm not thinking of right now. Here's the thing Dave, it's just what I figured out, actually, even after I sent them the draft of the book to the publisher is that Autophagy, and I'm pretty confident this is true, is not something you want to activate all the time.

Dave: No, no.

Dr. Mercola: No, no. I wouldn't be taking these polyphenols I was like nightly, like when I went to bed when I was activated through an intermittent fast, but I realized no, not a good strategy, and I'm only doing it twice a week. I take all these polyphenols when I do the partial fast, when I really up regulate autophagy

twice a week. I take it before I go to bed, where I've had like 30 hours of the fast and when I wake up, because I'm still not going to eat for another four to five, six hours. I get to blast of the Polyphenols, a hit at activating Autophagy.

Dave: There's going to be over the next 10 years, this huge amount of science that looks at which polyphenols do what? Which combinations of polyphenols do what for you based on what gut bacteria you have present, and based on what genetics you have? This is an incredibly complex data science thing to unpeel. We can only do it with big data and with the ability to measure all of those things. When we have enough human genomes, enough gut bacteria genomes, and enough of this, it's the same thing we've been doing for the past 80 years with amino acids.

Dave: What does Amino acid number one do? What does Tryptophan do? What does Tyrosine do? What does glutamine do? Then, what happens if you put two of these together? Then, there it's even more complex because if you glue two of them together into a di or Tripeptide like Collagen. Tripeptides and Collagen and do something different, than the Amino acids and Collagen. You go down this rat hole of complexity. What you've done in Keto Fast and even just some of the basic principles of the bulk of tight, only have fat in the morning in order to extend that effect of that breakfast. Because, even then you got energy, you didn't activate any Insulin, you didn't activate any protein digestion.

Dave: All of those things are the very beginnings of what we're starting to learn about what this big variable in our environment, the food is going into our body. When someone talks to me about calories, I just want to laugh. I'm like, "What kind of calories? Candle wax is full of calories, but I'm pretty sure it's different than drinking gasoline, which is also full in calories. They're just not all the same. You can't even think about it that way because it's like below reader's digest level of simplicity of things about nutrition, but your doctor still says calories." All right, so I'll get off my soapbox. You already know all this stuff.

Dr. Mercola: No, but it's important to repeat it for the listeners and there's no question, and I really greatly appreciate you're being a leader and helping the community understand this because not many people are teaching this. That's what I really, really value about your approach and your ability to network with individuals who understand this is at deep level because it's hard to tease out, it really isn't there, but the two other polyphenols that are important that I forgot what we were Fisetin and Resveratrol.

Dave: What about Apigenin, is that a Polyphenol as well?

Dr. Mercola: Apigenin is an interesting one, it is useful. It's hard to get high concentrations, Fisetin and you can get pretty high, you can get milligram quantities. It's hard to get milligram parts of Apigenin typically, I guess you can, but I haven't found a really good source of it. It inhibits CD38 and CD38 is an enzyme that's outside your cells and is the one of the biggest extracellular consumers of NAD plus.

Interestingly, so with theoretically increase NAD plus if it worked, that's what Sinclair believes in a lot of others.

Dr. Mercola: Here's the cool thing actually, I'm reading Sinclair's new book that comes out in a few months and I just read this morning because I didn't realize the mechanism. We know that fasting will increase your NAD plus levels by 30% so, the need for Apigenin it is diminishing if you're already increasing it by 30% why do you need to do that? The mechanism is that, it up regulates the rate limiting enzyme in the Salvage pathway. Essentially, the contorting Nicotinamide my back to NAD and that's NAPT that enzyme. That's how fasting works, which is an interesting way.

Dave: Now, Fisetin is available in capsules. I use it in a couple of the formulations I've created, and I've taken Fisetin for a very long time. I think, the most common sources, seaweed, or strawberries if I'm remembering right.

Dr. Mercola: No, I think most of it. I thought, it was called Fisetin.

Dave: Fisetin, yeah.

Dr. Mercola: The primary sources from some Australian pine tree.

Dave: Interesting.

Dr. Mercola: In food, the highest sources is strawberries.

Dave: The supplements don't come from strawberries. I do know about that.

Dr. Mercola: They do not. They do not. I could never find a source that was from this Australian pine needles. Interestingly, it has a very poor absorption, Fisetin. Do you know how I take my Fisetin? I was doing Intrarectal Fisetin.

Dave: I'm just going to have to say this Dr. Mercola. That's gross. No, I'm kidding. Guys listen, IVs work really well. IVs require a needle going into your vein. If you take certain nutrients and you put them in not your mouth, the other end with the right things they will absorb as well as an intravenous nutrient and it's cheaper and less painful. Dr. Mercola is not alone in this. Do tell, do you have a recipe?

Dr. Mercola: Yeah, I do. I can share it with you, but the Fisetin has very poor oral absorption, and I use this same strategy. There's two nutrients I take transmucosally because the rectum is full Mucosa, which has essentially very similar absorption rates as Intravenous. It's not quite, but you know, close to 80, 90%. The other nutrient I use is Nicotinamide riboside, that's my favorite NAD plus precursor in addition to Niacin, which is like dirt cheap. I take pretty much every day but only 25 to 50 milligrams, just small, small amount. Not certainly, larger than that, because that's about what you normally lose per day in the Salvage pathway. But, Nicotinamide riboside is actually an interesting nutrient because it's

natural, it's in breast milk. This thing is not some exotic is crazy chemical. It's totally natural.

Dr. Mercola: You've interviewed Charles Brennan before who was actually at your event, and I attended his presentation. I talked to Brenner after his presentation, because I was trying to ask him and he wouldn't pick on me for whatever reason anyway. I escorted him after the presentation, and I said, listen, what do you think about, if you swallow NR orally, there's no question about it. The vast majority of is going to be methylated by your liver. That's why the NAD plus levels are really high in your liver after NR. Now, you do get some other systemic benefit, but I think it's minimized because of the methylation process. So I said, "What do you think about using it transmucosally through the rectum?" Then he was just like, "Well, I never thought of that. Or it's just like, I don't know who's going to do a rectal?" He had no clue about it.

Dave: For people listening, we're talking about something the size of a pencil eraser, it's not like a horrible, uncomfortable thing.

Dr. Mercola: I'll tell you how I do this. You buy the raw materials, and you get it and there's a number of companies that sell NR, and Fisetin is available in other companies. You just get it and you put in one normal dose, an oral dose. The way you do it as you get Candy molds on Amazon, that's made of silicone. The one I use is, I don't forget the name of it, but it has 66 wells and the actual mold looks like an inverted candy, Hershey's kiss.

Dave: I thought you were going to say Christmas tree, for a minute there.

Dr. Mercola: No, no, it's a candy Hershey's kisses, in about the same size as a Hershey's kiss, maybe a little smaller. Because it doesn't have as wide a base. It's more of a cylinder and it's a candy mold actually. You fill it up with, you melt some coconut oil. In December, if you're listening to this, it won't be an issue because it's usually a liquid at room temperature, but if it's winter or cold, then you have to heat it up. You pour it into well and then maybe halfway and then you open the capsule and put it into the well and then you fill it up with coconut oil again. You fill all the wells up and then you put it in the refrigerator.

Dr. Mercola: Now, you know my time's a little bit too valuable for me to do this, I pay someone to do that for me. Then you keep it refrigerated, and then I do it twice a day. Not the Fisetin, I only use the Fisetin because it's Polyphenol during the fasting, but the NR I use every day and twice a day and just do it interactively. The key here though, there is a cylinder, so you don't want it. You would think you'd put the pointy in at first, but you actually put the base of it in first. Otherwise, it tends to pop out.

Dave: You can also just on Amazon, you can search for a Suppository mold and have little things that are designed with more of a teardrop shape.

Dr. Mercola: Yeah, and that'll work too.

Dave: For people listening and are going, "Wait a minute, are you serious?" But, bottom line is if you get maybe 10 or 20 times better absorption that way, then you do it from swallowing the pill. Let's talk about money. Do you want to spend 20 times more and swallow 20 times more supplements or do you want to be really effective on that frankly?

Dr. Mercola: It's not even just the economics. I mean, because there may be some concern about them metabolize of this stuff we just don't know, especially with some of the polyphenols or even NR. Who knows what Methylated NR is going to do? Studies have never been done. We're in a new territory, but we know that NRA itself, as it gets into your system systemically is really safe and highly beneficial because it will increase your NAD plus levels. There's lots of studies on NAD and NR benefits even non-use transmucosally.

Dave: You mix a coconut oil? I've used good cocoa butter or coconut oil.

Dr. Mercola: Either can work.

Dave: Then you put it in the freezer so that it's cold enough that it solidifies and both of those, cocoa is interesting because it melts at exactly the temperature of your body, which is why chocolate has that cool when it's real chocolate in them made with wax. It has that cool mouthfeel. Then coconut oil melts at a lower temperature than your body, it has to be relatively cool. Otherwise, the whole thing gets liquid. I prefer cocoa butter.

Dr. Mercola: That's a good improvement in the system. It's a little pricier than coconut oil, and you almost always have to heat it to put it in there. It's a more elegant solution, there's no question.

Dave: I will admit, I don't do most of my vitamins that way, but I certainly, things like SOD and catalase, which are important for dealing with excessive free radicals after flying and things like that. I have no problem with transmucosal delivery systems, we'll put it that way. There may be sometimes where you wouldn't want to do this because your levels could get too high and even be unsafe. I would just encourage anyone who's thinking about doing this, don't go out there and take everything in your vitamin cabinet or even worse, your pharmaceutical cabinet and blend it all up because you're playing with, you need to know that it's okay to have a high dose of it and just be careful and pay attention.

Dr. Mercola: I would caution you to reconsider the SOD and Catalase, those are two important antioxidants. SOD for is a Dismutase superoxide, transmuted into hydrogen peroxide, then Catalase to take the peroxide to water, well, water ideally. The danger of doing that is those are really important signaling molecules and you're playing with fire in my view. The better way to I believe is

to up regulate them hermetically, and there's some very elegant ways to do that. The best probably being a molecular hydrogen.

Dave: More so, than Ozone therapy. Interesting, all right.

Dr. Mercola: Ozone may, but I'm not familiar with it. I just haven't studied that perspective, but there's a number of intriguing molecules, biological molecules will do it. Molecular hydrogen is one, and then you've got Sulforaphane, which of course is from Broccoli, Broccoli sprouts. It not only up regulates the Nrf2 Pathway, but it does something really intriguing that we're going to talk about, which is one of the other benefits of Fisetin and maybe we can delve off here, right?

Dave: I think, we need to tell people what SOD and Catalase are, just because I think people would say, "What the heck is going on here?" I have too much SOD, a horror story as well. Why don't you share what SOD and Catalase are and what they do. Then, we'll talk about how to manage oxidative stress.

Dr. Mercola: Well, they're essentially antioxidants and mostly produced in your mitochondria because that's where they're mostly made because most of the super oxide is produced in the Mitochondria. It's an artifact of transferring electrons to the electron transport chain, and that's part of the process. Normally, interestingly, this isn't an interesting side effect or tangent, is that if you're metabolically healthy, like you and I are, most of your listeners, you're going to jet, it's not a perfect transfer. Those electrons from your food to energy, you're going to leak about three to 5% of the electrons out and they'll develop super oxide, which SOD, Superoxide dismutase transmutes to hydrogen peroxide. Then, the peroxide is neutralized by Catalase to water.

Dr. Mercola: Though, that occurs normally in mitochondria, but if you're metabolically inflexible and you're primarily getting your food and most of your calories from carbs, especially unhealthy carbs, then you're going to generate instead of the three to 5%, you might generate 40% more. You have the increased oxidative stress, just burning your fuel for energy, which is crazy. Oxidative stress is a prescription for disaster, unnecessary active, you need some because they're really important biological signaling molecules. Which is why I get back to the other argument why taking exogenous antioxidants like this will do, you're careless may not be a wise strategy because you're like playing God almost and you're trying to figure this thing out.

Dr. Mercola: My approach is to let your body figure out if you need it by giving these biological molecules. See because, molecular hydrogen just doesn't encrypt frivolously increased your SOD or your Catalase or Glutathione. It assesses exactly what the parameters are of your biological damage, and if you need it, if you have excessive oxidative stress, it will dissociate from the keep one protein which gets it active and it goes into their DNA, activates the anti-LMCV response, that amounts to RE genes and will help your body make those antioxidants because it's almost instantaneously. You got it right where you need it in the cells, in the Mitochondria so that you can neutralize it, oxidative

stress. I think, it's why so that your body do the heavy lifting, rather than you try to micromanage it.

Dave: I very much appreciate and support that perspective. Healthy Mitochondria ought to be able to make enough antioxidants to handle their own stuff. When I was 300 pounds and I had serious metabolic derangement, for a variety of reasons, including the time I was a raw vegan for a while and not to mention toxic mold exposure and heavy metals and eating lots of the wrong foods and all the other stuff. But, I did find antioxidants like those were helpful and as I got metabolically healthy, I said, " I'm going to try suppressing SOD and take some supplements that are targeted SOD." I did this for four days and I have not felt that wrecked in so long because when you don't have enough free radicals generated by your Mitochondria, they down regulate their functions. Within four days I felt like I was making a third as much energy as I should.

Dave: I really was just, I mean I have to put one foot in front of the other today, which is not my characteristic state. I don't take those supplements at all except after I fly. You have a very large spike in free radical production that isn't really good. I found that a relatively low dose transmucosal, SOD and Catalase does make a difference for me, but only on a functional use when I knew I just did something unnatural to my biology. Taking a long flight is not good for you, but potentially if I was breathing hydrogen or doing some of the hydrogen stuff, maybe it wouldn't even need to do that. It's been working for me so far, but it's once a week.

Dr. Mercola: One way to do that, but let me seek to upgrade your flying remediation.

Dave: Yeah, tell me.

Dr. Mercola: Because it's an issue for most of us and I unfortunately travel about once a month on it.

Dave: Let's have a whole like 10 minutes where we both talk about the best cellular level travel hacks and all the other stuff. I want to compare notes with you, I've wanted to do this for years. Let's do it.

Dr. Mercola: I think, I've got it.

Dave: You go first.

Dr. Mercola: First of all, let me tell you the day, but wolf strategy doesn't work and just fly at night because I've taken a meter up there, a Geiger counter and it's the same level at night and a day time. The earth isn't going to shield you from the sun's rays there, it's pervasive. It's ionizing radiation up there as gamma rays, at 35,000 feet, very similar to x-rays, not as high a dose, it's a fracture. Depending on how long your flight is, it could be the equivalent of one chest x-ray, CAT scans are about 200 chest x-rays. Whatever we're talking about for remediation

of flying damage is also crucial, critical, vital that if for whatever reason you need a CAT scan, you've got to implement this strategy, otherwise you are going to get damaged and it's very severely no question about it, because if we're talking about mitigating ionizing radiation damage.

Dr. Mercola: What happens during this? What happens is that the ionizing radiation damages your body in two ways or your DNA primarily, which is what we're concerned about. It has enough energy to directly break the DNA covalent bonds, either single or double stranded breaks, but that's not the way most of it gets done. It gets done by creating, by hitting the water in the cell, in the nucleus, spinning off hydroxyl free radicals, and they're hydroxyl free radicals are what bust the bonds. You get direct and indirect damage, and that's what it has to be repaired.

Dr. Mercola: Now, thank God your body has a system designed to repair this, and you may not have heard this before Dave, but the system is called PARP, P-A-R-P, Poly-ADP Ribose Preliminaries. What PARP do, this is so cool, PARP, I don't know if you know any that NAD plus embedded within that molecule is ADP. Did you know that?

Dave: Mm-hmm (affirmative).

Dr. Mercola: What PARP does it suck out the ADP from NAD plus, not just from one NAD plus from about 150 molecules of NAD plus. It creates this matrix of ribose polymers that essentially creates a framework, so the DNA repair enzymes can come in and repair that damage. You've lost 150 NAD molecules of NAD for every strand you bust. It would make sense, and there's no question about that this PARP depletion of NAD is the single largest consumer of NAD plus. I think, one of the primary strategies is to replenish the NAD. Previously, I was using the NR recommendation, but I was upgraded because I was actually using NAD, up until earlier this year, I was not a fan of NAD IV or other methods to get intravenously.

Dave: I love this stuff.

Dr. Mercola: It's because I was unaware of a transport mechanism, and I couldn't find in literature but, but James Clement kindly showed me where it was and isn't NAD plus transporter to get in the cell, because it's charged molecule won't get in spontaneously. It has to have a transporter and at the transporters connects in 53 and it gets into the cell. Now, I'm a big fan and I used to use these patches, the battery patches that you put on your skin. I learned from your co-founder of Upgrade Labs, Martin Tobias, he took me aside, one of these in the call.

Dave: He's the President and CEO, but I founded it a couple of years before I hired him.

Dr. Mercola: Okay. I'm sorry. I'm sorry.

Dave: That's okay.

Dr. Mercola: I just didn't remember correctly.

Dave: He just served few positioning here.

Dr. Mercola: He's a cool guy was it was great to meet him. He pulled me aside and told me with the details that you had talked to the apothecary. Now have a buffered NAD solution that you can inject Sub-Q and that is clearly the best way to go. Like 0.1 cc sub Q of NAD buffered solution is stable for months. It's like, wow, that is the best way to do it. Then, the other one is really cool, and another reason why I do partial fasting or Keto fasting and when I fly. I'm like, I'm going to fly to Austin on Wednesday or Thursday, I will do a partial fast on Wednesday and I will not eat Thursday. I'm going to go into Austin 40 hour fast. High ketone levels do a number of things, they increase NADPH.

Dr. Mercola: One of our previous interviews you had, we were talking about Mitochondria, you were describing Mitochondria is the battery of the cell, but it really isn't the battery of the cell. The battery of the cell is NADPH. That's the reservoir of reduction-

Dave: It's a storage mechanism. I agree with you.

Dr. Mercola: It's a storage. You restore this reductive potential that can recharge your antioxidants like glutathione, and all the other ones that you need and high ketone esters, will do that and they're also really potent histone Deacetylase inhibitors. If I'm flying, I like to have my ketones two or three and that's the take time to take the ketone ester. You can take a ketone esters, I still haven't figured out the timing on this. You could take it when you're flying, but some Veech's who's probably ... you've had him here before?

Dave: Yeah, [Richard] Veech has been on the show.

Dr. Mercola: He's one of the world's experts on it this and his associate is Bill William Curtis, he's another cool guy. The studies they published showed that if you do, at least in rats, if you do a 24 hours after the ionizing radiation exposure, it obliterated almost all the damage. That's what I'm doing now, it just makes it a little more convenient. I take the dose after I land or the next day after I land.

Dave: The other thing that's completely transformative for me, it comes from a Nick Foles, the Super Bowl MVP, who's a friend, who's been on the show and just an amazing human being. I've worn compression socks for a long time when I fly because the evidence is pretty strong about that. He's like, "Dave, now you've got to try the compression pants." Really? I texted him and I'm like, "All right, tell me the brand, because I bought some that didn't work on Amazon." He told me, I don't have any deals these guys, but he told me, "Try the 2XU ones are the

best ones I found." There's no commercial or anything there. I bought those and I saw, that works. Then I went and I started testing compression shirts.

Dave: If you see me on an airplane and I look particularly ripped, it's because I'm wearing a full body, basically, from my ankles I'm on the pants all the way up to your midriff, then I have a compression shirt as well. I wear it for several hours after I fly. The reason I think this is so important is that electrons move around inside your cells and your cells swell up when you're in high pressure. Well, when there's no room for them to swell up, they don't swell up. Your electron transport is noticeably improved just because of the cells can't get bigger. I'm telling everyone, listening, if you go out and spend, it's going to cost you about 100 bucks for good pair of compression pants, about 125 bucks for a compression shirt. That's a lot of money. But, if you do that and you wear that when you fly, when you get off the airplane, you will feel more like yourself than you possibly could imagine. It actually works.

Dr. Mercola: Interesting. The addition I would add to that is, consider wearing any EMF blocking shirt under that compression.

Dave: I do that actually I do that on top of the compression.

Dr. Mercola: You wear on top of it? Okay.

Dave: Yeah, because you get wrinkles get annoying.

Dr. Mercola: I have to wear it underneath. I made mine myself with the sewing machine.

Dave: Now, we're, we're seriously exposing the level of Geeks that we are a Dr. Mercola. I bought a t-shirt a while ago that did that, I put that on over my compression shirt. But, where I have my cell phone, my cell phone is usually on airplane mode when it's on my body. You're more militant about that than I am. What I did find is that where my cell phone sits against my leg, I don't put it near my organs, so I put it on a pocket on my femur basically. My right femur had 10% less bone density than my left femur where the phone is. I'm like, "Dammit."

Dave: Now, I went out and I bought EMF blocking fabric and I sewed it all in on the inside of my pants where my cell phone sits. If it's turned on and it's against my body, it's still getting blocked. Because, maybe I'm just paranoid, but that 10% bone density was enough to get my attention.

Dr. Mercola: Interesting. Reminds me of one of the amazing people in the audience at one of my presentations was a part of OsteoStrong, who you've interviewed before, John?

Dave: Yeah, John Jaquish. I like John. He's been on the show.

Dr. Mercola: Yeah. One of his associates in the UK was there and he shared that. I changed his life by watching my video that I did on the beach, he moved from the UK to Spain. He's giving me an OsteoStrong, he wants my bone density to be higher. That OsteoStrong, it's an amazing machine, they're not that they're few and far between, but boy that can radically increase your bone density.

Dave: They have a franchise small business thing, There's great science in it. When you look at all these little hacks like that or something else, I'll do, I should mention for flying, I bring one of the True Lights. This is one of the companies I started, the one that makes the glasses, the True Dark glasses.

Dr. Mercola: Yeah, those are great. I love this. Especially the new ones, the graded ones.

Dave: The sunset ones?

Dr. Mercola: Yeah.

Dave: By the way my name's on the patent for those, I was like, "This is a good idea because the angle of light coming in matters and we tested it out and it worked." I'll use the red light and infrared light therapy, when I get back to my hotel room. I noticed that, that also just really helps. It seems to help my sleep as well. I'll tend to use that and mostly over my organ systems.

Dr. Mercola: You travel with that?

Dave: Yeah, we have one that's a little panel. It's not particularly big.

Dr. Mercola: I think, I saw it. It was like about the size of a small 12 by 12 inches.

Dave: I think, it's either 12 by 12 or 12 by 14 or 14 by 14. Dr. Mercola, I'm interviewing people I want to learn from you and so I sometimes feel like, I don't want to talk too much on an episode, but here, you have a great amount of knowledge, so it's cool to swap notes with you and to share things.

Dr. Mercola: Those are some really good hacks. I love it. I'm going to start doing them.

Dave: Go for it. I would just encourage everyone, like you're listening to this going, "What the heck are these? They're either injecting themselves or sticking stuff wherever." You don't have to do everything we do, but we're insanely curious people looking to live a very long time and feel really good and bring a lot of knowledge to the world and all that kind of stuff. It just takes energy management. Even if you're not a highly sensitive person, like I am, I was pretty wrecked so I would feel everything.

Dave: Now, I'm highly resilient compared to anything I've ever been, but I know my weaknesses and I know that with the amount I fly every week, I fly somewhere. I am doing a level of flying that would shorten most people's lives and still made

short in mine, but I'm doing that for a good cause. That means, I'm going to minimize every year. If you fly once a year to Hawaii, you're going to do this because you want to feel good in Hawaii and get an extra day of quality vacation out of it. But, if you do this every day for a living, you better know how to fly like a boss.

Dr. Mercola: Yeah, because it's well documented that flight crews have a 30% increase risk of cancer. It's primarily because they're not able to mitigate the oxidative stress that those strategies are just making sense.

Dave: One more for you. Ready for this one?

Dr. Mercola: Yeah.

Dave: As I make this box I sent out once a quarter. It's a curated box of cool Biohacking stuff and I sent this out about maybe a year ago. It's a charcoal mask. By the way, if you guys want to know all my cool Biohacking little toys, it's biohacked.com, B-I-O-H-A-C-K-E-D.com. This is a curated box of goodies I send every quarter. This charcoal mask, it's a little breathing masks like somebody you'd wear at burning man. I have one in my bag and I've only had to use it about five or six times, but there's something called a Fume Event on airplanes. You'll usually get this on the ground, but sometimes in midair, and we've all experienced it, probably one time, you smell a huge amount of jet exhaust because the airplane has sucked in its own exhaust it when it was on the ground.

Dave: Now, what they do with jet fuel is they insert or they mix in a neurotoxin into the jet fuel and it's there for a good cause, because it makes the jet fuel much less explosive, so the airplanes don't blow up as much. That's good for us. However, if you breathe that stuff, it wrecks you. I noticed that on the times when this one happened, the entire flight I'm trying to read, I'm trying to focus and I'm just like in like someone gave me a Valium or something. It just wrecks my brain and I don't feel good for hours and hours. That can happen or hydraulic fluid can leak onto the compressors that are compressing the thin atmosphere during flight. You smell this weird burn plasticky kind of smell. Yes, I put my mask on. If I smell that stuff and I feel fine afterwards and if I don't, I lose eight hours of productivity and God knows what my liver had to do with all that stuff. I carry that, but I don't normally use it.

Dr. Mercola: That's a good stretch. I've been, usually been packing a little personal air filter that secretes some Ozone and negative ions. I don't know that, that would disrupt those chemicals, but probably the filter mask would be better.

Dave: It's one of those backup things. It's normally in the bag, but also during forest fires it's useful.

Dr. Mercola: Yeah, absolutely.

Dave: I'm going to call this the end of our first episode with Dr. Mercola and we're going to continue the interview on the next episode of Bulletproof Radio. Thank you for listening to this one. If you loved this episode, I'd be grateful if you went to iTunes and just left a quick review that said, "Bulletproof Radio is awesome." If you haven't had a chance to check out Keto Fast, Dr. Mercola's new book, you should definitely order it.

Dave: I've got to make sure that I say this, if you value this kind of thing, leave a review. Review Dr. Mercola's book, review my books. Just take five seconds to go to Amazon. My personal thanks for doing that because as authors, we really notice and we value that. I will see you on the next episode where Dr. Mercola and I are going to talk about the other stuff he shared onstage at the Biohacking Conference.