

# **THE MODEL HEALTH SHOW**

**EPISODE 486**

## **Metabolic Individuality & The Critical Nutrients To Unlock Energy**

**With Guest Robb Wolf**

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**SHAWN STEVENSON:** Welcome to the Model Health Show. This is fitness and nutrition expert Shawn Stevenson. And I'm so grateful for you tuning in with me today. Today we're talking about one of the most important topics in health overall, which is, how do we dial in our nutrition for ourselves? There are so many incredible diet frameworks that are available for us today. Everything from a paleo protocol to a vegan protocol to a carnivore protocol, and everything in between. There's such a broad spectrum of different frameworks that people are getting great results with, but there is usually a large percentage of people who don't get great results utilizing these frameworks, and the question is, "Why? Why, when it's working so well for a friend or a family member, would it not work for me?" And that's what we're diving into today, and really diving in and looking at our unique metabolic fingerprint with one of the foremost experts, somebody who really helped to impress upon culture, bring this conversation forward, when really paying attention to your uniqueness, your metabolic uniqueness, and understanding what are some of the underlying tenets that can help us to find which nutrition protocol is going to work best for us where we are right now.

And here's a heads-up, that is even going to change, very likely for most of us, at various points in our lives. Our metabolism our health is very fluid, it's always in flux and very changeable, it's dynamic. But we tend to find something that might be working, and we latch on to it, and we hold on to it for dear life, and if it stops working or it's not working as well, we start to relent that it's us, we're the problem, we're not doing this diet protocol good enough. And so, we might fast more or harder, we might restrict more, to cut away more carbs. Whatever the diet framework is telling us we need to do, we might go a little bit too far, and start to get diminishing returns, and then blame ourselves.

When in reality, we need different things at different times. And so, really pumped about this conversation, because it helps to take some of the pressure off, when it's so easy today to believe that we are broken if a diet isn't working for us, when nothing could be further from the truth. And also, we're going to be looking at what is this powerful foundational tenet to the function of our bodies overall, from our metabolism, hormone function, immune system function, cognitive function. What is this missing piece? Largely missing piece, dietarily speaking, that once you fulfill this need, it's like a light switch gets turned on, everything starts working better. We're going to talk about that today, and it's really, really going to knock your socks off. So, make sure to listen in deeply, pay close attention, because it's a game changer. Now, before we get to our special guests, let's jump into the Apple Podcast review-of-the-week.

**ITUNES REVIEW:** Another five-star review titled "Must Listen to Podcast" by K Lebron. "All of the information is presented in such an easy-to-understand way. Shawn shares so much

knowledge with an easy-going sense of humor. There is no lecture style dryness here. It's like nerding out on wellness with one of my good friends. I regularly share tidbits with my friends and family, and I'm commonly known to start sentences with, "Shawn says." If you're looking to up-level your life, this is your jam."

**SHAWN STEVENSON:** That's amazing. Thank you so much for sharing that. And you are in for a real treat today. We've got somebody else who could definitely nerd out but making all of this make sense. Making it approachable. And he's just one of the best in the world to do it. And our special guest today is Rob Wolf, and he's a former research biochemist, and is a two-time New York Times best-selling author. He's the author of the books, *The Paleo Solution*, which was just a massive best-seller. Who really helped to... He's the guy who really popularized the concept of paleo, that framework, paleo nutrition. But also, over time, he's really got to a place where understanding even the paleo framework for everybody is not going to be appropriate, and how do we modulate things so that it fits you and what you need. Also, his other book, an incredible read as well, is *Wired to Eat*. And Rob has functioned as a review editor for *The Journal of Nutrition and Metabolism*, and as a consultant for the Naval Special Warfare Resiliency Program. And he serves on the Board of Directors for Speciality Health Inc, and a number of innovative startups with the focus on health and sustainability. Let's dive into this conversation with the amazing Rob Wolf. The legend, the man, the myth. That's in reverse sequence. How are you, man?

**ROBB WOLF:** Good. How are you, you handsome devil?

**SHAWN STEVENSON:** I'm doing good, man. Real, real good.

**ROBB WOLF:** Good to see you.

**SHAWN STEVENSON:** And we were just saying... We were talking the other day, like, we can't believe how long it's been since we've chatted, hung out. You're one of my favorite people in this space, and...

**ROBB WOLF:** Thank you.

**SHAWN STEVENSON:** But the great news is, this is a great time, when we need to hear from you more than ever.

**ROBB WOLF:** If that's the case, then we are totally screwed. Abandon all hope. Women and children first, get off the boat, like run.

**SHAWN STEVENSON:** Abandon ship.

**ROBB WOLF:** Abandon ship.

**SHAWN STEVENSON:** Listen, you know the thing I really admire about you the most... Well, there's many things. But one of the big ones is, there's a tremendous amount of diet frameworks, obviously, and you've really helped to usher in the understanding that... Because a lot of people buy-in fully, they jump into the diet framework, they really work hard at it, and follow it to the T, but they don't get the same result somebody else might get. So, you've really helped to bring in a new understanding of personalized nutrition. So, can you talk a little bit about that? Because some of the data that you shared in your earlier book, and *Wired to Eat* even, looking at how, even compared to a banana and a cookie, the impact that it might have on somebody's metabolism from person-to-person.

**ROBB WOLF:** Yeah, you know, and it's tough, because do you want to... Is day one of working with our aunt or an uncle or somebody that doesn't do this stuff all the time, do you want to jump into protein leverage hypothesis, and if it fits your macros, and all the stuff? And the person is just like blown out of the water, and overwhelmed, and rightfully so. So, we have to have these kinds of simple heuristics. Like, here's kind of like some general guidelines. The problem with the general guidelines is people have a tendency to etch them into stone and turn them into religious doctrine. It reminds me of a *History of the World: Part One*, when Mel Brooks is walking down, and he's like, "I have 15," and then he drops one of the tablets. "10, 10 commandments."

And so, those commandments, then, become these almost like traps for people, who are like, "Well, I'm doing this, and I'm doing everything I should, and it's not working for me." And that's where we... I almost think about it like a microscope. Like you can zoom real deep, or you can back out and kind of get the surface level of like a microscopic slide, and we need both of those.

You can't have all the detail, and you also can't just have the 30,000-foot level treatment of these topics. And that's where... Gosh, I guess it was around 2015, maybe... No, I guess a little... Yeah, I guess around 2015. That there was a paper published by the Weitzman Institute out of Israel that looked at the individualized glycemic response in about 1000 people, and they did some amazing stuff. Looked at their gut microbiome, a full lipidology panel, genetic panel, and they tracked the glycemic response that these folks had to different foods. And it was crazy. Like there was so much variation both from person-to-person regarding their glycemic response, but also for a given individual with their glycemic response. And they had examples where somebody would eat a banana, and if we're graphing their blood glucose response, it was like they didn't even eat anything. It was like they drink water, there was no bump in their blood glucose response. Another person, they had nearly diabetic blood glucose levels from a banana, and then the flip side of that was with a chocolate chip cookie or bread. And so, what

I took from that was like, "Man, there's just a ton of individual variation." And it kind of... It helped to make a lot of sense with what I had seen kind of clinically, because some people would do great on A and terrible on B, and nobody did well on C. And so, it really helped to kind of customize those things, and I guess the one...

So, here comes to my religious doctrine. I'm like talking all this nuance and variation, but here comes the religious doctrine. I do think that starting things off with a focus on protein, make sure to get a gram of protein per pound of lean body mass on up to a gram of protein per pound of body weight, that seems to be an amazing place for people to be. Then from there, figure out, do you do better on carbs in general? Specific carbs. Are you more kind of keto-fueled, like I am, and you just do better with that? Or is it maybe a little bit of a mix? And then from there, really pay attention to immunogenic foods. Like do you react to dairy or wheat or nightshades or these different things. And I think that that's a pretty solid template that is more like lane-lines or bumpers, than really hard fast doctrine. And it allows people to understand what they need to do, to just tinker and experiment. But it also, I think and I hope, doesn't trap them in a way where they're like, "Okay, well, I tried really restricting carbs, and I felt like garbage, and I did this, this, and this to try to fix that.

I dealt with electrolytes, I did this, I did that, and I still felt like garbage. I do pretty well at moderate carb." Okay, done. Now, do you have any allergies or like gut issues or anything? "Yeah, you know, I do have some eczema." Okay, let's look at maybe some immunogenic foods. So, we can kind of peel the onion in that way, and it seems to work pretty well, and it doesn't make people feel like they're good or bad. It's like, "Oh, I have some moral failing, because a keto diet didn't work for me, because this group of people I'm hanging with are mainly keto, and so there's something wrong with me and I need to try harder on that." So, I've been really happy with that. And ironically, and I'm sure you experience this to some degree, because it's not particularly dogmatic, like people come give it a sniff test, and they're like, "No, there can't be anything there." And then they bolt off to the more dogmatic stuff.

**SHAWN STEVENSON:** Yeah. I've seen the same thing. And, thankfully, this happened probably a solid 10 years ago in my clinical practice. Basically, had the tenet, "If I'm doing it, you're doing it."

**ROBB WOLF:** Right, right.

**SHAWN STEVENSON:** And if it's working for me, it's going to work for you too. And I really came to the understanding, and seeing, thankfully, that everybody is so unique, and what people need is going to vary differently from other people. But sometimes what that person needs now versus a year from now can be tremendously different. So, giving people the tools to really dial these things in. And I want to dig a little deeper here, because with the data from

the Weitzman Institute, for example, what are some of these components that makes us so... To have so much metabolic uniqueness? And one of those things, I remember a study from the Weitzman Institute, and they were looking at samples from folks who are overweight and obese, and having that gut profile that's associated with obesity, and then having a gut profile associated with leanness for example. And so, I know that the microbiome is one of those factors that can kind of determine our metabolic uniqueness.

**ROBB WOLF:** Yeah, for sure. Definitely genetics as a starting place is a big factor. Chris Masterjohn put the existence of the amylase gene frequency on my radar, and amylase is an enzyme that helps us to break down starch. Like if we take something like a saltine cracker and chew it and chew it and chew it and keep it in our mouth, the salivary amylase, eventually, will break it down so it starts tasting sweet. Like it'll actually liberate some of the glucose out of that starch and it'll taste sweet. And then we have pancreatic amylase that helps us to break down starches, and... Basically, starches in the digestive tract. What's really fascinating to me is that there are some people on the planet that have a ton of copies of this amylase gene, so they break down starch really effectively, and then the super cool thing is that they handle starch very effectively. They have a very efficient insulin response to carbohydrates. 'Cause it would be a bummer if your body became super good at breaking down starches, and then it hits your system and it just crushes you, you know? But then you have other people have very few copies of the amylase gene.

And so, they don't do as well with starch. It's worth mentioning that all humans have far more copies of the amylase gene than our closest living relatives, the chimpanzee. So that's kind of... That's interesting. That's an interesting thing. Humans in general should be able to handle some amount of carbohydrate, I seem to be in a... A throwback to that. I wouldn't be surprised if I have fewer amylase genes than any chimpanzee, but... That just goes with my whole schtick. So, genetics is one starting place, and just that amylase gene frequency is a biggie. APOE genotype... Like E4 genotype, C3-E4. There seems to be some potential issues around, do you do well with saturated fat, yes or no? Folks with the APOE4 genotype, maybe they should adopt diets that are lower in saturated fat, and that seems to enhance their insulin sensitivity. Other people seem to have no issues one way or the other with saturated fat and their relative insulin sensitivity. And so, those are pretty big things just at the genetic level. And then we jump up to this more epigenetic level, probably most specifically that gut microbiome, and... It's funny, I will put a little feather in my cap on...

I feel like I was one of the earliest people really talking about the importance of gut health, really talking about the importance of the gut microbiome, and really added the Paleo diet concept. It is what elevated the gut microbiome to its current status, like people talking about it. Created enough interest to get the funding to investigate this stuff. The bummer is that, for me, this is an opinion piece, but we really know that the gut microbiome is important, and

then, other than treating to clinical beneficial outcomes, I don't know what the hell to do about it. Because when we do a gut sample, that is a picture of what is a 3D movie existing in time. If you sneeze, your gut microbiome changes. If you get scared, your gut microbiome changes. If you eat different food, your gut microbiome changes. So, we seem to have some... Some ideas like, "Okay, this looks like a healthy gut microbiome. This possibly looks like an unhealthy gut microbiome." But then, oftentimes, it's very difficult to affect much change from that, like dietary input seems to be a major factor. And for some people, ironically, like going carnivore seems to be like a huge boon for their gut health, and their health overall. Some people really desperately need far more fermentable carbohydrate, resistant starches, and whatnot to be able to do... Get favorable outcomes with the gut microbiome.

So, it is really interesting that we have these general profiles of kind of the gut microbiome, and maybe this looks like a leaner profile, maybe this looks more like an obesogenic profile. But, man, I've seen a hell of a lot of snake oil around that, where people are claiming, "Hey, you just need to do this supplement, or this prebiotic or this probiotic." And I've honestly... Maybe I'm just not smart enough to figure out how to do this, but it's been about a 50-50-coin toss for me. It's like, I'll do prebiotics with a group of people, and about half the people like, "Man, I'm pooping like a champion," and other people are like, "I'm like a goose and I can't stop." And so clearly, some of the people seem to benefit, and some people didn't. And so, it's... It's... I don't know if we're ever going to be at a spot where we will have a really solid predictive process. I do think some of this is so complex and it changes so much, this is where interfacing with a health coach or a good practitioner... You know, if somebody has problems, you're going to need a little bit of help figuring out how to navigate this stuff. 'Cause I don't know that we're just going to get a Star Trek style scanner that just tells us, "Oh, you need *Saccharomyces Boulardii*, and this much fiber, and you're going to be great."

But it is fascinating stuff, and if anything, for me, it really highlights that... Yeah, man, the gut microbiome and gut health is a major factor in this metabolic flexibility, metabolic health story, for sure.

**SHAWN STEVENSON:** Yeah, this is super important. But I love that you just mentioned this, we still know so little. And I don't know if we'll ever figure it out, because it's so fluid and so changing, so... Like you said, if you sneeze, the microbiome changes. But having these tenets, so these are wonderful frameworks. And this is a big thing I want to ask you about too, and just... I know you've noticed this. We've seen folks who... You know, we know the guys who promote the carnivore diet, who work with patients who've seen great success by utilizing that diet. We know folks who are using a vegan protocol and seeing great success with their patients. These guys aren't trying to mess people up or trying to lie to people, they're seeing results with people. And this is what I want people to really embrace, that there's a wide spectrum of potentiality that can really help and serve people at different points in their lives.

And it's really just based on you. And so, helping kind of tweak and dial some of these pieces in is really what we're looking at here, and giving people the tools to do so. So, you mentioned genetics obviously being a big role player. You mentioned the microbiome. But I want to go back, because you also said something, I don't want to scoot over this. Most of the infighting is between carbs and fat, right? But protein is largely the Rodney Dangerfield of this situation.

**ROBB WOLF:** Right.

**SHAWN STEVENSON:** You know? I get no respect. And so, you mentioned that seeing that as one of those kind of consistent things across the board where there's so much infighting with these two on the outskirts, which, again, we should have some conversation about it. But how important is protein? Why did you specifically mention protein being one of those consistent pieces?

**ROBB WOLF:** Yeah, and it's funny because both the... A funny thing is that we're used to carbs, was kind of the point of bickering between say like the low-carb camp and the vegan camp, protein has become the point of confluence between some parts of the low-carb world and veganism where people are afraid of mTOR activation, this gene that gets expressed under conditions of growth, and we need that, that over-expression of this gene seems to be very tightly correlated with cancer of various types and so on, like growth factors also tend to be stimulated by protein. So, it's interesting, I'm one of the folks that... I wrote my first article on intermittent fasting in 2005, and by 2006, I horribly regretted releasing this thing to the world because it went out to a group of folks that were mainly Cross Fitters and they are already type A over the top people, and they were intermittent fasting 22 hours a day, eating 5g of carbs a month, doing six CrossFit workouts a week, sometimes double days, but their day off, they would do hot yoga and a ruck march with a 80-pound pack.

And then, whether they were a male or a female, they would say, "Hey, man. I'm having some problems." "Okay, what are those problems?" "Well, I haven't had a libido in eight months. My hair is falling out, and I cry whenever a Hallmark commercial comes on." And I'm like, "Okay, well, tell me what you're doing," and they would describe what they're doing. I'm like, "My, God. Like, you took a bunch of things that are good. CrossFit, some carb restriction, some intermittency in your eating, and you maxed not one of them out, but all of them out." And there's currently this sense and there are some really smart people, far smarter than I am, much more credentialed than I am, who are really geeked out on lots of fasting, lots of protein avoidance, in particular and I think that they've got it all wrong. I think they've got it 100% wrong. I think that they're conflating the overfed state with... Which is clearly bad, with not understanding that if you get something like this ancestral template, you get enough protein, you figure out if you run better on carbs or fat, and then you simply don't overeat, I think that



the likelihood of the cancer, the neurodegenerative disease, all that stuff, drops damn near to zero.

And maybe a little bit of fasting is good, maybe a little bit of protein restriction is good intermittently, but people do it all the time. And the flip side of this is that when I see folks succeed on their protein allotment, and we do three resets a year as part of our Healthy Rebellion community, and I have people that have followed me for 10 years, they've read all of my books, they've listened to all my podcasts, and they're still struggling with, say like body composition issues, and when we have them weigh and measure their food, they're eating 50%-20% too little protein. And when they get that protein dialed in, just magic happens. They don't overeat, any other hormonal issues seem to normalize, and although there are some concerns around overconsuming calories for sure, like overeating is a bad deal, there's so much emphasis on autophagy and fasting and cellular recycling and everything, all with the idea that that is going to save us from cancer and neurodegenerative disease, and maybe it'll slow our aging a little bit and stuff like that.

But the thing that people miss is for all of us, we have a certain risk profile around cancer and neurodegenerative disease, cardiovascular disease, and most of that gets dramatically mitigated if we simply are not overeating, like the problems with that just plummet. But there's one thing that we all have a 100% guarantee that we face as we age, and that is loss of muscle, sarcopenic-related muscle mass loss, and that is a guarantee for everybody. If you live long enough, this is going to become the bastard that makes your life questionable whether you want to continue living like if you're otherwise healthy, if you don't lose your marbles, if you don't have a heart attack, if you don't develop an autoimmune disease, even if you train hard, even if you eat lots of protein, even if you go on HRT and whatnot, at some point you're going to lose enough muscle mass, that that is going to become a major detriment to the quality of your life.

Now, if we eat enough protein, if we do some resistance training, if we get some sun on our skin, we can push that out so far, like a 90-year-old individual who strength trains and eats enough protein can be as physically robust as a 50-year-old who is not super active, but otherwise healthy. That's a shocking improvement in the health span, so I really focus on the protein... And I know that was the longest answer to the most concise question ever, but the reason why I really focus on the protein is two-fold. One, it will improve our life today, we will be leaner, we will be healthier, we will have a better immune function, we will tend to not overeat, and everything that we do that improves our life today is virtually guaranteed to improve our life 40, 50 years down the road. And that's the orientation that I have on that, so I really start it from that protein-centric instead of that protein-phobic kind of perspective.

**SHAWN STEVENSON:** Yeah, and I think that's so powerful because there's so much about exclusion right now, and not a lot about inclusion, and what we need. We say these terms, but I think they just disappear into the ether, but these are the building blocks, protein is the "building blocks" for our body. No, seriously, it really is. And then if we look at thermogenic effects with protein, we look at, like you mentioned, when we even say the word hormones, our hormones are made from proteins, it's important. So, it's the same thing, but I think it's a bit of a stretch like when you mentioned actually looking at people's numbers and seeing they're not getting in maybe upwards of 50% of the protein that they might need and wondering why they're not getting these particular results and still trying to cut more carbs or whatever the case might be. And I love having this conversation with you because you're somebody who largely... I mean, more so than anybody truly who ushered in the understanding about low-carb movement, the Paleo movement in our modern era, you're the guy.

And then getting to a place where, yes, for a majority of folks coming in, we could do something with restricting those carbs a bit, especially coming from where most folks are coming from, but let's look at what you're trying to achieve in the gym, let's dial the carbs in around that, let's look at what you need based on your genetics, let's look at what you need based on where you are right now in your life. So, can you talk a little bit about that? Because carbohydrates, if we look at... We need, we require protein, we require dietary fats, carbohydrates are on the fringe, we could survive without them more so than the other two, but yet they can provide certain things that we might require that we don't realize.

**ROBB WOLF:** Yeah, and this gets sticky like this is where a carnivore MD, a vegan MD, and Shawn and Robb walk into a bar, and it's like shenanigans incur, because the carnivore folks make a very compelling case, they're like, you can probably get all the nutrients that you need out of just meat and there's probably a case to be made for that, I don't know that that should be the first whistle stop in dietary change though, like I am of the opinion that folks should tinker with as broad a diet as they can get away with without experiencing problems, folks with really significant gut issues, autoimmune issues, and they've tried a bunch of other things, man, carnivore can be an absolute godsend for those folks. But I'm not sure if your question is going to end up being better than my answer in this, but I do think that that finding as much latitude as you can get is a good thing, even just psychologically.

We had a gal in our community, Denise, who have a lot of health problems. She was significantly overweight, had some autoimmune gut-related issues and she had tinkered with everything, and she did a reset that was carnivore, and it was actually kind of one cut, what I call one-cut carnivore. It was kind of like that ribeye and ground beef, and that was it, and that's what she did for six months, she lost a lot of weight, all of her GI problems seemed to just completely resolve, and then it was interesting, she did what we call our seven-day carb test, which is from the Weitzman Institute, it was inspired by that where we have people eat 50g of

a specific carbohydrate, maybe it's corn tortillas, maybe it's white rice, whatever the deal is. And when she did that before her carnivore intervention, she had terrible blood glucose response, she felt terrible, the blood glucose would go sky high, it took forever for it to come down, she lost weight, she healed her gut, ironically on carnivore, this thing devoid of fermentable fibers and whatnot.

She then did the seven-day carb test, maybe eight months, nine months later, and she did great, on like white rice and sweet potatoes and different fruit, and so in her next reset, she actually included a good number of carbs, probably about 100-105g of carbohydrate per day, and she got leaner and she felt better and her sleep improved. Now I don't see everybody with these really significant gut issues come 100% back like she did, I wish everybody... I wish I did. I'm not that person, I'm kind of on that cusp of carnivore mainly because of gut and blood glucose response, but for a good number of people, she ticked enough of the boxes of getting lean, probably improving her gut health, probably resolving some nutrient deficiencies that then adding in some of these carbohydrate foods, it really made her happy, it's easier to eat that way, it's more socially acceptable. She really was very protein-centric and then just dropped into carbs and fat secondary to that and stayed within her caloric limit and she's crushing it, and she has a much broader diet than what she had previously.

Some folks might make the case. Well, she could have probably motored along and carnivore had been fine and maybe yes, but she's happier having that increased options within her diet in her life. I would be happier having more of those options within my diet in my life. So, I think that that is the thing that when people are tinkering with this, I think that those are the boundaries that we should always be pushing against, like can we get away with a little more variety instead of making the circle shrink all the time, having fewer and fewer and fewer options. And some people, their health situation it's like, if you're going to be healthy, you're going to have fewer options, and that's unfortunately, where you are, I'm in that camp, but not everybody is there, and I would say probably most people are not there. Most people, once they go through a process of just leaning out and improving gut health, it dramatically improves their glycemic response and the way their gut microbiome deals with all that.

So, I don't know if that 100% answered the question, but this is at least a procedural way of looking at this, I think of... There's probably a lot of different ways to get lean and maybe address gut health, but if you focus on those things, usually really good stuff is waiting for you on the back side, probably better metabolic flexibility, probably better gut health.

**SHAWN STEVENSON:** Yeah, that's a perfect example of our metabolism being able to change and evolve and improve our digestion, same thing. But one of the things across the board that... It's so crazy, we have to have this conversation is so overlooked for everybody, and a deep need on so many levels is our electrolytes. So let's talk a little bit about... First, if you can

give us a summation of what electrolytes really are, and let's talk about some of the things that they do for us that we simply can't have all the cool stuff that our bodies can do, just can't take place without them.

**ROBB WOLF:** Yeah. Yeah. That again, is a really good question. It's going to be way better than my answer, but operationally, electrolytes are these charged ions that include calcium, magnesium, sodium, potassium, phosphate, bicarbonate, chloride, might be a couple others in there, but we usually mainly think about sodium, potassium, magnesium as the main items there, and I've been doodling on this, and when we look at different physiological processes and how tightly regulated they are, the only thing that is more tightly regulated than electrolyte status is pH, and if somebody ends up in an emergency room, the two things that they check immediately is pH and electrolytes, because if those get off by just a little bit, you will die, you will either be very, very sick or you will die. And on the electrolyte side, particularly with sodium and potassium, literally every process in our body, every thought we have, every muscle contraction, is driven by sodium-potassium pumps. This is how we generate ATP to... It is the upstream process of generating ATP. So, it really is the currency of life.

Electrolytes do so many different things in addition to energy production, not the least of which is just regulating our fluid status, like sodium tends to be in higher concentrations outside of cells and helps to increase fluid volume in things like our blood plasma and whatnot. And then potassium tends to be preferentially higher concentration inside of cells, and that gradient is part of how we generate electrical impulses, and again, everything from digestion to heartbeats, to thinking are driven by that. What else do they do? Those are definitely the biggies, and when those things are off, like if we are too low in sodium, then we can end up with edema. This is where our hands can swell; in really extreme cases, you can get brain swelling. This is some of the unfortunate side effect of telling people to hydrate really aggressively during athletic events like marathons and triathlons, military boot camps, and whatnot.

And the unfortunate thing there is that, yes, losing too much water, body water can be detrimental to your health, but in a literature review, there was a fantastic review paper that made the case that in the complete review of the literature, they did not find one example of a person who was not trapped in a desert, trapped in a mine cave-in or something like that that died from dehydration. Like if people can find liquids, they will not die from dehydration, but we have thousands and thousands of examples of people creating a state called hyponatremia where they overconsume water, which dilutes the relative concentration of sodium in their blood, and then the kidneys will react to that by dumping potassium, dumping sodium and trying to re-equilibrate things, and people will die from that, from brain swelling. So, edema, swelling, blood volume, and then energy production are probably the really big things that people notice in a day-to-day experience and it's worth mentioning on the energy

production side, many people will get that mid-afternoon slump in energy, there could be a variety of reasons for it.

But if your electrolytes are off, like I had a cup of coffee today, and this is not a cup. It used to, I thought cup of coffee meant whatever the size of the container was, but there's actually like three cups of coffee in this thing.

**SHAWN STEVENSON:** Right, that's a mug.

**ROBB WOLF:** It's a mug. And if I drink that without any electrolytes, I'm setting myself up for kind of feeling off because I'm consuming so much liquid without any electrolytes. If you look in a textbook of medical physiology, hydration means water and electrolytes. It doesn't just mean water, and this is something that just got lost in the shuffle somewhere along the line, hydration just ended up meaning water, and it's worth mentioning way back in the day when Gatorade first came out, we had a friend of ours go to the Gatorade Hall of Fame, where they had the history of Gatorade, and they had a couple of the very first boxes of Gatorade there, and you could see the nutrition label, and that original Gatorade had a gram of sodium, a thousand milligrams of sodium per serving. And then over time, the sodium in Gatorade has come way, way down and the sugar has gone way way up, and that's kind of a problem. And I'm diverting off there, but Gatorade was so revolutionary originally because it actually had an effective dose of sodium in it.

And people get freaked out about sodium because it's associated with hypertension, but when we really dig into the literature on that, that mainly seems to be a problem of our modern diet, the main source of sodium that people get is from processed foods and whether Paleo or vegan or keto, most people are in agreement that processed foods are a problem, but when people clean up their diet, then the processed foods tend to disappear and the sodium decreases, and when we have a lower calorie load, a lower glycemic load, a lower carbohydrate load, our insulin levels tend to drop and then we tend to retain less sodium. So, in a less processed dietary environment, our need for sodium actually increases ironically. But it's difficult to get ahead of that, even if you're eating a Mediterranean-type diet of grains and beans and pulses and stuff like that, folks will salt that, but they don't oftentimes salt it to the degree that they really need to fix some stuff that is going on physiologically. This is interesting.

Cultures like Japanese culture and whatnot, things like miso soup, soy sauce, these very salty constituents have been a staple of these diets. You have similar analogous type products in the Mediterranean type diet areas, very salty, brined fruits and vegetables, like olives and pepperoncinis and stuff like that. Those have always been a main stay of these otherwise minimally processed diets, but then when you pull the carbohydrates out, when you pull the

refined foods out and then you pull these sodium-rich foods like olives and pickled peppers and stuff like that, then you're at very, very low sodium levels and that can have a pretty catastrophic effect on your electrolyte status.

**SHAWN STEVENSON:** That's bananas. I'm still reveling in the insight about the sodium-potassium pump and how sodium and potassium are involved in us even having energy, the creation of energy, ATP. This is so overlooked. We'd try to focus on the thing, the mitochondria, we need to make more mitochondria, how? How is it all going to work? And sodium being... So, it's really one of the things that's been most villainized in our culture, as you mentioned, but I think also... I've got to really highlight this again, if we're talking about processed food consumption, that's the vast majority, several studies are affirming this where folks are pulling in the most sodium, 70 upwards of 80% is coming from that. So, when we clean up our diet, all of a sudden we're lacking. And by the way, sodium and salt are synonymous, but they're not quite the same. Can you talk about that a little bit?

**ROBB WOLF:** Yeah, from a chemistry perspective, there are lots of things that are a salt. So, you could have a potassium salt, you could have a magnesium salt, so salt ends up getting used in a pretty broad term. Table salt is sodium chloride, which is 40% sodium, 60% chloride. And generally, when we say salt, people get what you're talking about so long as you're not squirreling around in a chemistry lab or something like folks will generally get the differences there.

**SHAWN STEVENSON:** Yeah. And so, you mentioned a couple of things that it just already should just jump out of our mind and our current paradigm on how important sodium is, and potassium, and magnesium, because it's required for us to literally make energy. This is that important, but also one of the things... And I sent you this study last night, I was like, "Hey, did you see this?" It's a big role player in our immune system, we don't fully understand why, but maybe if you can talk about some of the potentiality here. The study that I sent you, listen to the title of the study, guys. "Electrolyte imbalances in patients with severe coronavirus disease," and what they found was that folks who have severe outcomes from COVID versus folks who are maybe even asymptomatic consistently, they were seeing that sodium was significantly lower in patients with severe COVID-19. Bananas.

**ROBB WOLF:** Yeah. And we saw that one when it first came out and we were scared to touch it with a stick, which is bad, because it could be one of these things that is really important. I think an important thing to look at that is, what's causing what? Our folks who were arriving at the hospital or who are contracting COVID, let's say we've got 100 people and all of them get exposed to the SARS-CoV-2 virus, they start developing the COVID disease state, out of that group of people, are the worst outcomes driven more by arriving there with low sodium? Or is the disease process itself creating physiological changes that cause us to shed sodium?

So, I think that that's a really important question, and this paper doesn't really address that, but it does make the case that people who had appropriate electrolyte intervention fared better. That definitely was a takeaway on all that, and you know, the spiked protein enters the body via the ACE receptors, the ACE receptors are critical, they're all over the body, but where they are in the kidneys, they're really important helping to regulate the fluid status and the electrolyte status.

So regardless of which side of the causation story we have there, there's a very credible case to be made that if we have adequate electrolytes, specifically sodium, we could make a really compelling case that the outcome from the COVID disease state is probably going to be better, and you know how difficult of an intervention is that, like that is literally falling off a turnip truck, like that. But I don't know that it's necessarily on that many people's radar, I don't know how, on the radar of emergency room doctors, that particular intervention is. And so, again, these folks are always looking at electrolyte status when somebody is entering, say, like an emergency room or an ICU. But if they had a little bit of orientation, they were like, "Oh, man, if we're suspecting COVID, we should be particularly aggressive, especially on the sodium side of the story, and that may lead to better outcomes."

Yeah, it's a really fascinating and somewhat counterintuitive paper. I pinged you a possibly even more mind-blowing one, which suggested that nicotine may mitigate the effects of the SARS-CoV-2 virus with being able to enter cells. There was a shockingly lower rate of severe COVID outcomes among smokers, and this again, just blew people's mind. In the beginning, we thought that this was primarily a respiratory-driven illness and it's looking much more like a vascular-driven illness, although it can have respiratory components to it, but the hypothesis early were that smokers were just going to get absolutely hammered and they weren't. And so, then people said, and clearly, smoking is not good for you, it's rough on your lungs, it can have all these other problems. But they started also looking at people who were on nicotine patches and chew nicotine gum and stuff like that, and they saw the same trends there. So, there's a few studies out there looking at the mitigating effects of even nicotine on this stuff, and this is where... It's funny, there's a... Oh, God, I'm blanking on the movie.

Oh, I can't remember the name of it, but it's basically this somewhat futuristic movie where this guy gets frozen and he gets woken up, and it's not Idiocracy, it's another one. But basically, they're like everything that we thought was bad for you is good, like steaks, chocolate sundaes and cigarette smoking are what have kept humanity alive, basically, is what they say. So, it's interesting and not to derail this thing, but I think that this is where it's really important in this kind of censorship world that we maintain some ability to have some discussions. We will make a thousand mistakes and go down a thousand blind alleys, but the one... We have two alleys here of investigation, like adequate sodium intake and the potential that like a nicotine patch could dramatically mitigate the effects of the COVID infection, those are really worth

investigating, but it's hard as hell to have a conversation about that stuff without getting cancelled.

**SHAWN STEVENSON:** Right. Thank you so much for bringing that up because that's what science is, is it isn't definite, and it seems like right now, it seems like everything is so definite all of a sudden. But you also mentioned within that context in that study earlier, sodium was a big deal apparently, and also the researchers mentioned similarly, potassium was also significantly lower in COVID-19 patients with severe disease. Now, what you mentioned earlier was the fact, and I lean towards this, which is probably sodium was getting zapped as their body was trying to deal with the issue because it's required for so many processes; very similarly to magnesium, it's required for so many processes in the body that we know about, hundreds, upwards of like 650 biochemical processes depend on magnesium. But potassium and sodium, playing second fiddle right now, but they all are important. And they're all under this umbrella, this family of electrolytes.

And so, to put all this together... These are just new things that we're tinkering with and things that we should think about, but we already had a little bit of evidence regarding electrolytes and the immune system. So, can you talk about that intersection a little bit?

**ROBB WOLF:** Yeah, that interface, like I'm definitely not an immunologist, I've had immunology, but it is not my strong suit by any stretch, but when we think about a couple of different things that would have effect on the immune system, our fluid and hydration status, that is definitely going to have an effect on the immune system, and one of the most direct effects there is actually on that adrenal HPTA axis, when we start getting into a hypovolemic, low-sodium, low-blood volume environment, we will tend to upregulate the production of both epinephrine, adrenaline and also cortisol, because although the main hormone that tends to retain sodium and retain fluid volume is aldosterone, another adrenal hormone, both epinephrine and cortisol cause us to tend to retain sodium. And what do we know about the effects of cortisol on the immune function? It suppresses it, and that can be good under some circumstances, if you have a super powerful inflammatory response, even some of the really avant-garde treatment around COVID involved the precise application of cortisone derivatives to suppress the immune response transiently so that that overactive immune response didn't actually kill people.

But if we're not in that situation, we really want our immune system firing in all cylinders, we want both the B cells and the T-cells; the B-cells producing their antibodies, the T-cells developing the memory around what the organisms or the particles are that they want to identify and be able to remove and so just mechanistically, if we get into a situation where our hormonal access gets dysregulated, that's a really plausible mechanism for how it could suppress immune function, and it also... The flip side of that is that if we fix that, that stressor,



the too low of sodium, too low of blood volume, dysregulated sodium potassium levels, that should really improve that hormonal access too.

**SHAWN STEVENSON:** Yeah, thank you so much for sharing that. And another piece, just bringing everything together, if we're looking at different diet frameworks and how these electrolytes might "accidentally" gets zapped from our diets, we need a good source to bring these things back in, and the other day, prior to us even connecting and my wife, she took it upon herself to take a little dance into keto land. And this was our first time really taking on a ketogenic protocol, she just decided to do it, and everything is going really well, and a couple weeks in, she decided she's going to get back into the hot yoga. It's so funny, you mentioned the hot yoga earlier. And afterwards, she was just trashed, and she was like, "It wasn't that difficult." I don't know what, she was just dragging. And a friend of mine, Jay Ferruggia, gave me a couple packets of LMNT, L-M-N-T, and I was like, "Hey, give this a shot." And it's kind of like a commercial, "Hey, give this a shot." And she had it, and I swear, this was so crazy, and I had to reach out to you and your folks after this.

Within 20 minutes, she's like, "I feel so much better." And I was just like, "That doesn't make any sense. That's really remarkable." And of course, she's sweating this whole thing, but we think it's just hydration, but the electrolytes are that critical component, and we know that a lot of the electrolyte products out there are absolute trash and also just having the formula right dialed in with the ratio of magnesium and sodium and potassium, and you put that together, you and your team, and I know it was a labor of love to have that right formulation without the added sugar, but still tastes pretty good and providing all these benefits. So, can you talk about what triggered you to give birth to LMNT and also what's gone into creating something like this?

**ROBB WOLF:** Yeah, yeah, it's interesting. I'm on my 23rd year eating more or less a ketogenic diet. I've tried some different things like safe starches and whatnot, but I really seemed to feel good here; my cognition is good, blood sugar is stable and all that. Historically, I've been able to lift weights and do cardio on that, and I'm fine, but if I did anything like jujitsu or CrossFit or something that was more glycolytic, I just didn't have that low gear at all, and I have been casting around, I'd tried to do peri-workout carbs, pre-workout carbs, post-workout carbs, and it would help a little bit, but I was always fighting getting back into the carb roller coaster afterwards, and I was just kind of like, "Woe is me." Like, I'm like the toughest nut to crack, can't fix this stuff. And then I met these two guys, the founders of Ketogains, Tyler Cartwright and Luis Villasenor, and I saw them just getting... They work with tens of thousands of people, and they get... And it's mainly women, mainly between like 45 and 60, and they get these amazing results with these folks, which is jaw dropping. They had a really good community, they use an appropriate protein, ketogenic kind of intervention.

And I started hanging out with these guys. I basically stalked them, and eventually got them to take a look at what I was doing, and I explained, "I don't have this low gear. I have this kind of low energy at various points." I'm like, "Oh, man, the nutrition is pretty on point, but you weren't getting enough sodium." And I was like, "Oh, no, no, I salt my food, I'm good." Because what do you do when you speak to a world expert on something? You ignore them, of course. They give you advice and you just ignore them. A good year went by, and I kept just struggling and flailing, and they're like, "No, man, really, here do this. Put everything you're consuming, like everything, how much you're salting your food, the whole ball of wax. Put it into a chronometer, and that will give us your protein, carbs, fat and that'll also give us your sodium, potassium, magnesium, calcium." And lo and behold, I was getting less than half of what they recommended on the sodium side, they were recommending a minimum of 5g a day and I was getting 1.7g per day, which was right in line with what like the American Medical Association recommends for sodium intake.

And so, I really diligently started adding sodium, I was drinking pickled juice, eating olives, and it was just like a light switch was flipped and this is super self-serving to couch it this way, I'm a co-founder LMNT, I have a significant stake in the company and everything, but when you just look at the physiology... Our electrolyte status is very dynamic, and if you are low in electrolytes and then you consume some, about five minutes later, your body is normalizing, so you will start feeling better, literally, almost immediately. And this is what I experienced, and I was all full of piss and vinegar excited about this stuff, and they were like, "Yeah, I understand. I've known this for 10 years." And this is worth mentioning within the ketogenic or low-carb diet space, this understanding of protein, carbs, fat has become very sophisticated. The understanding of electrolyte needs, it's as if it doesn't even exist for most of the space. And this is something that got lost in the shuffle between a medically supervised ketogenic diet, where they will make sure that you get adequate sodium versus pop culture ketogenic diet where sodium is just an afterthought.

We knew that this was really important. We spun up a free PDF on how to brew your own keto aid, it's like this much table salt, this much potassium chloride, this much magnesium citrate, lemon juice, Stevia, shake it up, go. And we had a half million downloads of this thing within six to nine months, it was really popular, and folks really seemed to benefit there, like I was struggling, I was having all these problems, and then stuff just resolved. Two things happened: People started tagging us on social media saying, "Hey, I love the keto aide, but when I travel, the three bags of white powder in my carry-on are a problem, when they've got them all out there in front of TSA and it looks like they're coming out of Medellín, Colombia or something like that.

And then the other thing was just like, Hey, I do like this, but having a convenience play on this would be great, and that's where we put the idea together of spinning up LMNT and the way

that we formulated this... We went back to that chronometer information that Tyler and Louis have on their folks, and we looked at the amount of sodium, potassium, magnesium and calcium that people got from a whole food, minimally processed ketogenic diet, like what did they get from the dietary constituents themselves, and what we found is that people were totally good to go on calcium, they were a little bit deficient in magnesium, a little bit more in potassium, but they were woefully deficient in sodium. And so, we literally formulated it to plug that gap.

And to the point on sugar, there are some folks that say that you can't absorb sodium without sugar. That's patently false. You absolutely can, there's lots of other mechanisms for absorbing sodium. There are situations where you would like to add some sugar with your sodium, like really severe gastrointestinal diseases like cholera and whatnot, that cause massive diarrhea, you absolutely want to do this oral rehydration therapy protocol of sodium and glucose because it enhances the absorption. But for the vast majority of people, they just don't need more sugar, so we didn't formulate it that way when we work with athletes, we tell them to use things like glucose tabs and stuff like that.

So, if they want sugar in conjunction with their sodium, they can dose it appropriate to their needs versus trying to do a one-size-fits-all, it's like a 5-foot 3 woman versus a 6-foot 3 male, they may both be active, but their needs are going to be shockingly different, the sodium is more similar than the glucose needs between those two people. So that's why we opted for just a sugar-free version of the product and knock-on wood, but so far, it's been going really well.

**SHAWN STEVENSON:** Yeah, really well is an understatement. It's crazy, the stories. The person who gave it to me initially, he was just going on and on about it before we're about to record a show, we were recording for his show, and he was like, "Dude, you got to try this. I can barely even drink water now without this, I feel so much better, I didn't even know that I didn't feel good." It's just like turning, like you just said, kind of flipping a light switch. And so, of course, I reached out to your team and I was asking what can I do for my audience, and I was surprised at what they said, I was thinking like, it's going to be some kind of discount, they actually said, "We're going to give everybody a free sample," which was just nuts. So, everybody go to [drinklmnt.com/model](http://drinklmnt.com/model), that's [drink-L-M-N-T.com/model](http://drink-L-M-N-T.com/model) and you're going to get a sample pack of a variety of different flavors from LMNT, and all you do is pay for the shipping and they're going to send it right to you. So, it's a good way to try it out, see how your body jives with it.

I could tell you first-hand experience again, I've got stuff pretty dialed in, I feel pretty good, but there's sometimes, especially with we've got a big workload, like this particular day, I was recording three different things, it was like an hour long, tons of content, my brain is just like dumping all of its files out into the ethers. And I had some, and then I was just on a call, and

then afterwards, I just was like, "Hey, let me do this, let me do that," and I started knocking out all these other tasks, and I'm just like... I feel really good. Like what's going on? And I thought maybe it was just because of one of the people that I talked to just giving me some good vibes, but what it really was is just like my cells were just... It wasn't... And here's the key, it wasn't some kind of spiked out jittery squirrel feeling, I just really felt like myself. I felt really in my body, the best me was showing up in that moment.

**ROBB WOLF:** And this illustrates why you're at least like three to five times smarter than I am because you've just been exposed to it, and you get it. I'm a co-founder of the company, and I'll be motoring through my day, and I'll walk out of the office, my wife's like, "How you doin'?" I'm like, "Oh, I feel like dog today." And she's like, "Have you had any electrolytes?" And I'm like, "No." Yeah, so not only are you better looking, you're much smarter than I am too.

**SHAWN STEVENSON:** Stop it. Stop it, not true. Not true. Robb, I appreciate you so much. I wish I could talk to you... We're just going to have to have you back on. There's so many other things I want to ask you about, especially at this day and age, and I love your ability to analyze data for you to help make stuff make sense for folks, and this is such a gift, I think, really to... Especially the community of folks who are active, who want to perform at their best, you want to feel good, cognitive performance, but it's something so simple that it's often looked over and for you to put the muscle behind making this available, it's just really, really cool about you.

**ROBB WOLF:** And again, in closing, I would love to have folks check out LMNT, but if it's like you grab a jar of pickle juice, or you get some chicken bouillon cubes, or we still have the free downloadable guide on [drinklmnt.com](http://drinklmnt.com) that'll tell you exactly how to make the exact formula that we have. So, just by hook or by crook, I would encourage people to really take a fresh look at their electrolyte status, in particular, their sodium intake, foods like olives, 10-12 olives provide a gram of sodium. So, if you don't want to drink an electrolyte but you want to do olives, do olives. But the main thing is to really make sure that you're addressing that sodium need. The funny thing is, if people try LMNT, it tastes really good and it's super convenient, and so they usually end up buying it because it's easy. Yeah.

**SHAWN STEVENSON:** Yeah, yeah. Well, Robb, can you let everybody know where they can connect with you, get more information and just get tapped into your universe a bit more?

**ROBB WOLF:** Probably the three main places, [robbwolf.com](http://robbwolf.com), [sacredcow.info](http://sacredcow.info) was where all the work that I've done in the regenerative ag space lives, and then [drinklmnt.com](http://drinklmnt.com). That's pretty much where I am.

**SHAWN STEVENSON:** Perfect. I appreciate you so much, man. Thanks for hanging out with us.

**ROBB WOLF:** Thank you. Good to see you.

**SHAWN STEVENSON:** Robb Wolf, everybody. Now, I really want to reiterate how important electrolytes are. Electrolytes are minerals that carry an electric charge, our body is literally running on this electrical currency. Electrolytes enable our brain cells, for example, to communicate with each other, they're essential, they're needed for signal transduction, for the transmission of electrical signals between your brain cells, so it's important. We're oftentimes looking for these very complex... These new innovations when it comes to human health, but the foundational things are often overlooked and they are truly the most important, and some of these foundational pieces are making sure that we have our electrolyte basis covered. Being that electrolytes are so essential for the brain, take sodium for example, not only is this electrolyte required to maintain proper fluid balance in the brain, so we know that the brain is upwards of 80% water, is the most water-dominant organ in our bodies next to our lungs, so that fluid balance is incredibly important.

So upwards of 80%, unless you've got that dry brain, but making sure that we have the optimal electrolytes to maintain that water balance. Sodium in particular is critically important. Now, a really fascinating study conducted by researchers at McGill University found that sodium literally functions as an "on-off switch" in the brain that helps to maintain and drive the function of specific neurotransmitters that support optimal function and protect the brain against numerous diseases like epilepsy, like neuropathic pain, really helping to function and drive these pathways that control and defend the brain against dysfunction. Sodium, is that important, but we only hear sodium in the context of something negative and not understanding how important it is, and when you're deficient in sodium, really bad things can start to happen in the body, it's one of the things that we need quite a bit of, but we don't really talk about that in a proper context, because in the standard American diet, upwards of 70%, 80% of the sodium that we're taking in is through processed foods.

So not only are we getting this massive influx of sodium, but it's coming along with very deranged amounts of sugar, of artificial ingredients and all these other things that really create this chemical soup of dysfunction, but sodium is the one that's blamed, and a part of that is because not only is sodium required for all these different bodily functions, it's also involved in regulating our blood pressure. And so, in simple terms... So, what is blood pressure? Well, in simple terms, blood pressure is really the force that blood is placing upon the walls of our blood vessels as it's circulating throughout our entire body. And high blood pressure is when that force is elevated to the point that increases the risk of damage to the blood vessels and the cardiovascular system overall, including the heart, and the loudest gripe about salt and sodium... Well, again, these are two different things though. They're used interchangeably,

but the loudest gripe about salt is that it increases blood pressure, which is true to a degree, there's a lot of nuance here.

But the research that initially vilified salt many decades ago, and a lot of folks don't realize is, originated from animal studies that gave rats massive amounts of salt, it was about 50 times the average intake or what will be correlated for humans, 50 times the amount that we would normally have, and it deduced that salt is a major contributor to high blood pressure. That's where it all started. That's where it all started. Now, here's the data we have today, a large-scale multinational study that was just published recently, found that salt intake does not increase health risk even at levels that were once deemed to be unhealthy. So, what gives? How is this even possible? The researchers in the study concluded that elevated blood pressure is a symptom and not a cause of cardiovascular disease and morbidity, and dietary salt is on a much lower rung of things that contribute to the problem, with bigger issues being elevated triglycerides, stress hormones, and inflammation.

So, these other components that are coming along with the rampant intake of processed foods in our culture today. One of the things that I really work to bring to everybody just to first, get face-to-face with the current situation, and we did a masterclass on this, it was the history of sugar, and we'll put that for you in the show notes. You've got to see or listen to that episode. It is an absolute masterclass on sugar and the impact that it has on the body, but also the history of how we got to this place where currently today, the average American is consuming about 100 pounds of added sugar every year. Depending on which resource you look into, 70-130 pounds on average. Some people are consuming more than that, and by the way, again, that's added sugar, that's not even the naturally occurring carbohydrates and sugar that is coming from the foods that we're eating. So, if we're talking about folks that are eating a lot of bread, for example, that's not even taking in consideration the glucose response from that. About 100 pounds of added sugar, 100 pounds a year.

So, what's the big things that changed in our recent diet, in our recent culture? The influx of processed foods and sugar, and these things being a big drivers of elevating our triglycerides, really damaging the function of our overall hormonal cascade, in particular stress hormone response, and also creating excessive inflammation. So, this is what the research has found to be the major factors regarding high blood pressure, hypertension, cardiovascular disease and morbidity, not the salt. And the study specifically found that even up to around two teaspoons of salt per day is not problematic for most people, noting that there are genetic predispositions for some folks who have challenges managing salt. Now this number in and of itself, two teaspoons of straight salt, and we're not talking about, again, there's many different compounds here, but sodium is oftentimes used interchangeably with salt, but they're two different things.

So, this might seem like a sizable amount compared to the conventional RDA, but what's even more eye-opening is that salt intake closer to and below the RDA of about one teaspoon per day actually increases the risk of cardiovascular disease and increases the risk of high blood pressure when the salt intake is too low. A meta-analysis published in the Cochrane database of systematic reviews uncovered that study participants placed on a low-sodium diet did have slightly lower blood pressure in the short term but found that the restrictive sodium also led to elevated triglycerides, elevated stress hormones, and accordingly elevated blood pressure.

Now, some folks might be salty to hear this, but this is the truth, and this is because sodium is required for so many functions to take place in the body. Literally, we can't even generate energy, ATP, the energy currency of our cells without the sodium-potassium pump, without sodium being involved, potassium and these other electrolytes. It's that important, we can't just create this broad brush, this broad statement that sodium is bad for you. It's insane, and even the levels at which we're getting sodium in and having them be so tied in with salt in and of itself, and not understanding the uniqueness of sodium, the uniqueness of potassium, the uniqueness of magnesium, and how important they are for health and overall function. This is why this conversation today is so important, so we can get a better education on this stuff.

Also, a study conducted by researchers at Harvard Medical School and published in the journal, *Metabolism*, found that low-salt intake directly increases insulin resistance in healthy test subjects. Salt supports cellular communication and improves the function of many of our major hormones, they're dependent upon these electrolytes to do what they need to do. Additionally, research cited in scientific reports reveal that a low-salt diet can increase levels of the hunger hormone ghrelin, so this is the big driver of our appetite as well. So, sodium helps to regulate that. So again, sodium is required to conduct impulses of our nervous system, it's required for muscle contractions, it helps to maintain proper fluid balance within our tissues, not just our brain, because again, our cells literally could not hold on to water without our electrolytes. And sodium is just one. Potassium is incredibly important as well. Magnesium, we've talked about this many times on the show, it is the number one mineral deficiency really in our world today, about 56% to upwards of 70% of our citizens are deficient in magnesium, it's required for over 650 biochemical processes in the body that we are aware of.

And what that means is a deficiency in magnesium, when we're deficient, that's 650 things that the body can't do or can't do properly because of this deficiency. And if we look at the electrolyte function in the brain in the context of magnesium, a fascinating new study published in the journal, *Neuron*, found that magnesium is able to restore critical brain plasticity and directly improve cognitive function. I can go on and on, there's so much incredible data about the importance of these electrolytes, and yet it's not discussed very often in the health paradigm. There's a big battle over the macronutrients, there's big battles over chemical additives and things like that. But what are the things we need? What are things

our bodies require to function at their best? So definitely a huge fan of LMNT helping people to get this dialed in, getting their electrolytes dialed in based on data tracking thousands of people to see what are those optimal ratios of these electrolytes. Easy, convenient, you get a free sample, free trial, just go to [drinklmnt.com/model](http://drinklmnt.com/model). That's [drink-L-M-N-T.com/model](http://drink-L-M-N-T.com/model). Just pay for shipping, they're going to send you a free sample of LMNT right to your door. Incredible, incredible value.

So, again, electrolytes are critically important for optimizing our cognitive performance, helping to hydrate and sustain every cell in our bodies, helping the creation of ATP with our mitochondria. Again, we can do all this stuff with exercise to try to generate, create more mitochondria, but what's the point if they can't even do the job that they're capable of doing, which is being this energy power plant in making energy for us, ATP, this energy currency. So, our electrolytes are critical in that. And I just want to keep this conversation going because these simple principles of health are the things that are often overlooked. We get into this very stimulant-driven culture where we're lacking energy, we're lacking performance, and we go to these superficial things and not addressing the foundational things that our bodies are really built on, and electrolytes are a big part of that.

So, I hope you got a lot of value out of this episode. If you did, please share it out with your friends and family on social media. Of course, you could tag me, I'm @shawnmodel, and we've got some powerhouse shows coming your way very soon. We are truly just getting warmed up. I appreciate you so much for tuning in. Take care. Have an amazing day and I'll talk with you soon.

And for more after the show, make sure to head over to [themodelhealthshow.com](http://themodelhealthshow.com), that's where you could find all of the show notes, you could find transcriptions, videos for each episode, and if you got a comment, you can leave me a comment there as well. And please make sure to head over to iTunes and leave us a rating to let everybody know that the show is awesome, and I appreciate that so much, and take care. I promise to keep giving you more powerful, empowering, great content to help you transform your life. Thanks for tuning in.