

# Paleo Solution - 371

[0:00:00]

Robb: Hey, folks, Robb Wolf here, another edition of the Paleo Solution Podcast, really excited for today's guest. Dr. James DiNicolantonio is a PharmD, he is a cardiovascular research specialist, and he's really fascinating in my perspective in that he has tackled a topic which is salt and sodium intake in a way that has never really been done before, and it seems to parallel a lot of what we've seen in the macronutrient wars, in the claims made around dietary saturated fat and cholesterol and some of the interesting back story behind science that maybe starts off with an interesting idea and then maybe gets picked up by a charismatic individual and it becomes enshrined in what we do on the broader scale of both society and within medical circles. Dr. DiNicolantonio, thank you so much for being on the show.

James: Thanks for having me, Robb.

Robb: Hey, so, I'm curious, how did you -- again, before we started recording, I mentioned that I had just a lot of questions. I want to set up some background. It's always interesting to understand a little bit about the folks that I'm talking to. How did this topic even get on your radar? The idea that we should eat less salt, that sodium can negatively impact our health, ranging from cardiovascular disease to claims of increasing cancer rates, how did you even think to start looking at this?

James: Yeah, that's an interesting question. Basically, I've never really fully thought that the low salt advice for everybody made much sense because I've always been athletic. I ran cross country in high school. I wrestled in high school. I knew that my performance sucked if I didn't get enough salt, and I knew that I sweated out salt. I didn't really realize how much but from that basic level, I never really fully bought into this restriction of this essential mineral. It does parallel what you said. The low anything has never worked. Low fat didn't work, and low saturated fat doesn't work. To try to say low for an essential mineral like salt just doesn't make sense. Even cholesterol, low cholesterol is a nutrient and that didn't work. Now we're reversing our opinions about cholesterol and saturated fat. Now with the book, hopefully people are starting to understand the benefits of salt.

So it stemmed from that, but when I was practicing as a community pharmacist, I was having patients, they're coming up to me and saying, "My doctor put me on this low salt diet for high blood pressure, but I'm dizzy all the time, I can't exercise anymore, having spasms." I was like, "It sounds like the advice isn't

working out for you. It sounds like you're having symptoms of salt deficiency." I would say, "You should go back to your doctor and tell him these things and maybe get your blood sodium levels tracked." I had several patients do that and actually came back to me and said, "My blood sodium level was very low, and the doctor cut out my diuretic and told me to salt my food more." Within days, they said their symptoms improved. So what I was seeing in the real world wasn't reflecting what these guidelines were recommending and that's really how I got into, well you know what, I need to research this topic because people can be potentially harmed from this advice.

Robb: Yeah. It's interesting. Clearly I'm in this whole Paleo diet camp and there was a lot that was very right about the Paleo diet concept. Theoretically it's steeped in this evolutionary biology perspective, and I so appreciate your early part of The Salt Fix book that you've recently written is that you really couched a lot of this story from an evolutionary biology perspective like, really to me -- and I'm a geek so I just like this type of stuff, but starts at this first principles kind of thing and then we start working forward. But interestingly, this is one of the things that some of our earlier folks in our story, Loren Cordain, got completely wrong which was a recommendation for very low salt intake. You do a masterful job of unpacking that. Could you talk about that?

James: Yeah, that's a really important question. I've had numerous emails, back and forth, with Cordain. I respect him a lot. We both respect each other a lot. What I keep telling him is, "You're basically one of the fathers of Paleo and you keep forgetting that an animal, literally, is full of salt, the blood, the interstitial fluid, the lymphatic fluid, organs, skin." I go, "How could you miss this?" I literally emailed with him the same, over and over, and just for some reason, he's still stuck on that Paleo is low salt. In the book I showed that it stems from one paper published in the New England Journal of Medicine, from the fathers of Paleo, Voegtlin and Boyd are considered the fathers and Cordain took the torch as well.

**[0:05:27]**

Just one liter of blood contains 3200 milligrams of sodium and interstitial fluid can be even higher than that, lymphatic fluid can be higher than that. The skin is a tremendous reservoir of sodium. We're not stupid. Animals go to salt licks. Humans would find a salt lick and go to it too. So the original paper that concluded that a Paleo diet, at the most, would contain 1400 milligrams of sodium, I dissect the paper and say actually what those authors looked at, from a dietary source, they only looked at land plants, not aquatic plants, which can have over 500 times the normal salt as land plants. They only looked at muscle meat. They didn't actually calculate how much salt is contained in blood and interstitial fluid and all those other sources that we would have consumed.

If you look at the amount of sodium in a 70-kilogram deer, it has got 150 grams of sodium. So one deer would give you 30 days worth of a normal sodium diet that we consume. Today it's about 340 milligrams a day. So when you start dissecting those types of sources of salt, you can see that you can obtain salt very easily just by consuming the whole animal. The problem is if you go to the supermarket, you're not getting the whole animal anymore. You're just getting a dry piece of muscle meat, so you need to add real salt back to the foods. Especially nowadays, there are all these things that cause salt loss like caffeine and exercise and low carb diets and all these other things and so we need to be on the lookout for things that cause salt loss as well.

Robb: Right, and you do a great job of unpacking that as well. I'm still somewhat chagrined to admit this but years ago I did some research for the military when I was doing consulting for them, and in talking about nicotine consumption, that that is a potent, even more so than caffeine, depleter of sodium. I chew a little bit of nicotine gum when I'm writing now. I did some research on it. I don't know what you would think about that as a pharmacist, but I've definitely noticed that as I've increased my sodium and general electrolyte intake in the past maybe year, year-and-a-half, I feel much better. I do Brazilian jiu-jitsu now. I didn't have the wherewithal to wrestle during high school, which I deeply regret now. You've got a background that I'd kill for, in that regard, but what are some of the other common things that folks are doing or consuming? You mentioned lower carb diets, caffeine, nicotine. Is there anything else that would be a surprise for folks that that could have a diuretic effect or a sodium wasting effect?

James: Yes, there are numerous disease states and one of them is sleep apnea. What ends up happening when you stop breathing at night is the body basically thinks that your volume overloaded from the increase in central pressure that happens when you stop breathing at night. So people with untreated sleep apnea, which there are 20 million Americans right now that have undiagnosed sleep apnea, they can lose over 3,000 milligrams of sodium at night which is sometimes why they're up at night just peeing all the time.

Hypothyroidism is also a salt-depleter because thyroid hormones actually help the kidneys to reabsorb salt. So the problem becomes, we need to continuously reabsorb the three-and-a-half pounds of salt that we're filtering everyday. We start spilling your internal sea, if you don't get it back pretty quickly, you can have very quick symptoms of salt deficiency. So hypothyroidism, there are 22 million Americans with thyroid issues, mostly hypothyroidism. What's funny is that not eating enough salt can lead to hypothyroidism because certain salts like Redmond Real Salt have good amounts of iodine and so if you don't get enough iodine because you're cutting your salt intake, that can lead to hypothyroidism and now you're not reabsorbing salt well.

There's also inflammatory bowel disease. I actually counseled these patients on a daily basis. People with Crohn's, ulcerative colitis, they don't absorb salt very well at all. So when you have damage to the intestines and you don't absorb salt well, that's another disease state. Even celiac and IBS, people that are having diarrhea a lot, they are not absorbing salt well. I have some family members who have had their colons removed and some of their intestine removed. That is how we absorb salt and so they don't absorb salt well. So many medications cause salt loss, diuretics, and many medications cause low sodium levels in the blood. Antidepressants, anti-psychotics, many diabetic medications cause salt loss, and going on low carb diets.

**[0:10:28]**

A lot of people are interested in how low carb diets and ketogenic diets cause salt loss. What ends up happening at first is ketones are negatively charged, so for about the first week they'll pull positively charged sodium ions with them. That's the keto flu. You lose a lot of water and salt during the first two weeks, but there's a chronic loss as well because glucose helps us absorb sodium in the intestines. When you're not eating exogenous glucose, you don't absorb sodium as well. That's why experts like Dr. Phinney and Volek, they recommend that -- most people seem to do really good on about 5,000, maybe even 7,000 milligrams of sodium per day when they're on a ketogenic diet for that reason, because you are not absorbing salt well and you're also losing more salt.

Then you have chronically lower levels of insulin, and insulin helps the kidneys retain salt. When you are insulin resistant for months, years, like most people in America, your kidneys actually become accustomed and used to elevated levels of insulin for reabsorbing salt. When you drop the insulin by cutting the carbs, it takes the kidneys a while to figure out how to reabsorb salt without the help of insulin. So that's like a third way of how people can chronically feel salt-depleted on a low carb diet. The other factors, you have all this energy now when you cut carbs. You can access your stored fat and and stored protein, and you want to work out. So people who cut their carbs end up working out more, sweating out more salt, and that's another reason why people need more salt as well when they start on a ketogenic diet.

Robb: Wow, so with good intentions and some good things going on though, you could really get yourself into a depleted state pretty quickly with all that.

James: Extremely quickly. There is in the New York Times a couple of months ago, a huge heatwave hit the UK, hit India, hit the Western Coast of the United States. People were literally dying of heatstroke. People are always saying they're dying of heatstroke. What they're dying of is salt deficiency because they're losing over 14,000 milligrams of sodium in eight hours in the heat. Our blood only contains

16,000 milligrams, so you can literally deplete all of the sodium in your blood in just eight to ten hours of standing out in the heat. Everybody is told to consume water, consume water, consume water. You're just making hyponatremia worse and people are dying of heatstroke because they're not replacing the salt back. So it's just one of those myths that we need to go on these low salt diets and yet the healthiest things we can do is to eat healthy food and exercise. Salt is an essential mineral that helps us do both.

Robb: Doc, what's interesting for me on this stuff is clearly we can get back in and unpack some of the story from an evolutionary biology perspective and whatnot, but it seems like a lot of the counter movement of which you're clearly a leader in this, was born of some just basic epidemiological research where we had these interesting U-shaped curves with regards to sodium intake, morbidity, mortality. I think that that launched people into some investigative routes to really look into this. Could you talk a little bit about that? It's funny because at this point, telling people that eating saturated fat and cholesterol is probably not going to kill them at the dinner table, is reasonably an easy sell, but I tell you what. In talking to people and recommending that, hey, you could probably get by with salting your food more particularly if you're active, particularly if you eat low carb; there's shock and horror on their face when you try to articulate this. Could you talk a little bit about that U-shaped curve? We see this in biology all the time. What does that mean with regards to sodium intake and population-wide morbidity and mortality?

James: Before I even go into that U-shaped and J-shaped curve that you're talking about, we've got to let people understand why we even believe salt is bad for us.

Robb: For sure, great.

James: It's only based on a single surrogate marker, blood pressure. In the book I showed that even if you get a reduction of blood pressure, that's not necessarily a good thing. You're just dehydrating the person, reducing their blood volume. That's why almost everyone gets a significant increase in heart rate which is the increase that happens in heart rate can be up to 25%. So if someone has a heart rate of 80 beats per minute, if they go on a low salt diet, it can increase to 100 beats per minute. I've literally seen studies where heart rate goes up 25%. The average increase though is about 10 to 15%, yet the average reduction in blood pressure is about 1%.

**[0:15:17]**

So when you look at the two, when you multiply the two together, the stress on the arteries in the heart is dramatically increased on a low salt diet, even if people get reductions in blood pressure which, again, even if you get that

reduction in blood pressure, a lot of those people are just dehydrated. They're dizzy. They're having muscle spasms. Your doc and the insurance company say, "Great, your blood pressure is down ten points. I'm not going to charge you as much." Yet the person is suffering from all these side effects of dehydration due to salt deficiency.

So the key message is that we blame salt based on blood pressure. We blamed basic cholesterol and saturated fat as well at the same time in 1977 based on an opinion never a fact, and all of those opinions just got integrated into the United States Dietary Guidelines in the 1980s. No one ever questioned them, and they simply got updated every five years. We still are recommending these crazy low saturated fat, low salt diets. So people that are shocked and horrified, I get it, but it's only one, single surrogate marker.

My books shows all the other harmful surrogate markers that are elevated when you cut your salt intake; the fat-storing hormone, insulin, goes up, you become insulin-resistant, to help the kidneys reabsorb more salt as the insulin levels elevate, bad cholesterol goes up, good cholesterol goes down, triglycerides go up, all the artery-stiffening hormones go up on a low salt diet such as Angiotensin II, renin, aldosterone, and you plot those hormones with medications to reduce the risk of cardiovascular events. All the stress hormones, adrenaline, noradrenaline, chronically, are activated which can lead to adrenal hypertrophy. With the aldosterone being elevated a lot and that can burn out the adrenals.

So when you look at all the harms of low salt, they try to say, well the reduction in blood pressure is going to supersede that, it's just crazy the we ever even thought that. When people can understand all the harms from a low salt diet then they can start to say, "Okay, this blood pressure mantra and low salt diet doesn't make much sense." Hopefully that is going to connect with people who are listening to this right now.

Robb: That's fantastic, yeah, thank you.

James: Yeah, and then you bring up the fantastic point of why are we now starting to see a turning point with salt? It really started in 1995 when Michael Alderman who is the Editor-in-Chief of the American Journal of Hypertension, he actually showed in patients who had heart attacks -- in 1995 he published a paper that those who were consuming lowest amounts of salt had the highest risk of death due to coronary heart disease. So that launched all these prospective studies to start actually looking at cardiovascular events, not just blood pressure, and people are consuming low salt versus high salt versus middle of the range, a moderate amount, and so Niels Graudal and other authors put out a lot of even meta analyses of prospective studies showing that people who are consuming

less than 3,000 milligrams of sodium are at the absolute highest risk of early mortality and strokes and heart attacks. Even the people that are consuming high amounts, they were at a slightly increased risk but not nearly as much as the risk that was associated with lower salt intakes.

So you see that J-shaped curve where when you hit the American Heart Association recommended intake of less than 1500 milligrams, there's almost a doubling of coronary heart disease mortality at that level of intake. So it's almost criminal at this point to be recommending low salt diets because we have this information out that shows people that are consuming low amounts are at the highest risk of mortality and coronary heart disease. There has never been any definitive proof to even put out the recommendations. The problem is that when something is out there, when something is recommended, it's very hard to unrecommend it. That's where we are with saturated fat and salt.

Robb: On page 13 of your book, you have, "We can start off by telling the truth," and I just have a little blocked off piece here, "low salt is miserable, low salt is dangerous. Our bodies evolved to need salt. Low salt guidelines are based on inherited wisdom, not scientific fact, all the while the real culprit has been sugar. Finally, salt may be the solution to rather than the cause of our nation's chronic disease crisis." When you put all this together and think about systemic inflammatory diseases, gastrointestinal issues, insulin resistance and all of its various forms, hypothyroid, on and on and on, and if sodium intake, smart sodium intake were to mitigate that, 5%; it would make statins look paltry by comparison. It would be the most efficacious, therapeutic tool we've come up with since aspirin or something. It is really incredible.

**[0:20:08]**

James: Yeah. In the book I really showed that salt is the antidote for sugar for numerous factors. It cuts bitterness in foods so, in a way, it provides sweetness so you don't have to use as much sugar when you use salt. Any parent knows that their children are not going to eat vegetables or nuts or seeds without salt on it, so use salt to eat real food. That's the message of my book. Use real salts to eat real food, to cut out the sugar. What ends up happening is when we don't get enough salt that can predispose to sugar and drug addiction. I have a full chapter on how that works but what ends up happening is animals just somehow know to go to a salt lick when they're depleted in salt, and the reason is the brain rewards system gets activated when we don't have enough salt. That's our safety mechanism to get a higher reward from salt so we consume more of it. We don't die of salt deficiency.

The problem is, nowadays, we're surrounded by all these other addictive substances that can hijack our brains on a low salt diet. So the brain is

hypersensitized, the reward system, when you're deficient in salt and so when you consume sugar or you consume drugs that abuse, they end up potentially more rewarding and more addictive. That is just another unintended consequence of how eating a low amount of this essential mineral can potentially lead to sugar and drug addiction.

Robb: Oh, that's fascinating, fascinating. Gosh, I'm thinking like 50 different things here, but how else can this drive into the neural regulation of appetite? Part of what I'm thinking here is I noticed as you were talking, I just reflected back, people will ask me, "Robb, what type of snacky stuff do you like?" For as long as I can remember, I've never really been a sweet tooth guy. I'll eat a little bit of sweet stuff here and there, but I've always been a salty, crunchy guy. I'll eat some chicharrones or things like that. Have I inadvertently reduced my predilection towards sweet stuff by driving more towards the salty, crunchy side of things?

James: Yeah, exactly. By driving more towards the salt end, you're not going to create as much sugar. There's a protein leverage hypothesis. There's not a sodium leverage hypothesis. You need to get enough salt or else you're going to search it out and get it. When you get too much, no one just sits there and eat spoonfuls of salt, but we can eat an entire bag of cookies. So your body is a safety mechanism where it doesn't want too much salt and the taste receptors, unlike any other taste receptor, for salt will flip if you get too much. We have this inherent safety mechanism for salt, but with sugar we don't have that. The sweet tooth, the more sugar you consume, the more you want and so by consuming more salt, you can dampen down the rewards system. Now some people cross their cravings for salt, for sugar and really, salt is the best way to dampen down the rewards system and thus you're not even going to get as high a reward, consuming those sugary foods when you're consuming enough salt.

Robb: Interesting. I've noticed, it's so funny because -- so I have a three-year-old and a five-year-old daughters. Both of them very naturally tend towards wanting to salt their food particularly the vegetables. It's funny because I've always been much more liberal with that. I'm like, oh, that's totally fine. My wife has been a little bit like, I don't know if that's such a great idea. I would have finished your book probably twice as quickly as what I did but I had to keep wrestling it back from her because she got in and actually read the whole thing, which she's a good reader but usually science-related stuff like this, she just doesn't get in and do it.

Now I've noticed, whenever we set up the dinner table, the salt grinder goes right between the two kids and we pretty much let them self-meter that stuff. Interestingly we always portion out some vegetables and whatnot, and we'll have mixed viand with that. The kids are real good eaters of things like sweet potato and meat and all that stuff. I tell you what, salting some of those veggies



like asparagus and broccoli and whatnot, I would say it has increased the consumption like three or four times.

James: Absolutely, and I see this. I have a three-year-old and five-year-old as well, a daughter and a son. I see literally the same thing, and seeing is believing. Sometimes when they ask for cashews with salt, I give them the course salt so they can see it because my son will be like, "Dad, I don't see any salt on it." So once they know that there's some flavor there, they're going to start eating those healthy foods, but people are so scared of salt. They'll buy these low salt processed foods thinking they're doing good for their children when really it's use the real salt to drive natural food consumption that they never would have eaten without the salt. It is important to get those foods that are high in magnesium and potassium that balance salt in the body, consumed, and use the salt to consume spinach and, like you said, asparagus and those more bitter greens to get the minerals that honestly, they're probably lacking because they're not consuming those foods.

**[0:25:27]**

Robb: Okay, that was my next question is how do we address some of the other electrolytes like potassium, magnesium, calcium. So basically, eat whole, unprocessed foods, salt to enhance flavor, and done.

James: Exactly, yeah. What's interesting is there has been several studies, actually giving balanced studies, there's 13 of those done, looking at patients that were put on a low salt diet. They were actually eating the very high end of the low salt diet. They were consuming 2200 milligrams of sodium but they were working out about -- they're exercising about an hour a day. What this study showed was that these patients, these people that were put on the low salt diet, they actually went into negative salt balance. So they were sweating out more than what they were consuming, and what the body was doing was stripping sodium from the bone to maintain normal sodium level in the blood. That's the body's defense mechanism so it doesn't die of hyponatremia.

The problem is that the body isn't smart enough to just strip sodium. It was stripping magnesium and calcium and leading to literally negative calcium and magnesium balance when following this low salt advice. So what I try to tell people is upping your salt status can up your magnesium and calcium status because if you don't get enough salt, the body is going to pull it from somewhere. Unfortunately it's pulling it from a reservoir that also contains magnesium and calcium. So one of the best ways to maintain your own magnesium and calcium in your bones is to be consuming enough salt.

Robb: Oh, that's so interesting. I remember that point in the book. You were even talking about osteoarthritis progression being heavily influenced by adequate or low salt intake.

James: Basically, overtraining syndrome and joint pain and things like that has been shown to be caused by salt deficiency in the tissue. You're constantly exercising, you're constantly sweating out salt, and you're just depleting your tissues of salt. So I've got people email me and message me saying they've had heart palpitations or muscle spasms for literally years and after upping their salt intake, because they're so scared of salt for all these years, within just three days of upping their salt intake, their heart palpitations went away, muscle spasms and cramps went away. So when I hear that type of feedback, that's honestly the best feedback and the best feeling that someone who writes a book can get, is people's lives are being improved by this advice, and that was really my goal for the book.

Robb: That's fantastic. Doc, you go in this pretty good detail talking about some of the performance enhancing elements of adequate sodium intake. You brushed on a number of those elements already, but could you go through, whether somebody is lifting weights or they're an endurance athlete, what are the performance enhancing characteristics here? It seems like it could go on almost forever because it's like, well, you don't have low thyroid and your adrenals are functioning well so your sex hormones are probably going to be good. Could you go all the way from an endocrine level also like fluid volume, cardiac output, would you mind unpacking some of that with regards to what the benefits of adequate sodium would be for a performance-oriented individual?

James: Yeah. When I first started dosing myself with salt, I said, "Why did I not do this before, before exercise?" Because it's night and day. Anyone will tell you who starts dosing themselves with salt before they work out, if it's a moderate type of activity, they will tell you, they don't get those type of exercise-induced headaches. Because honestly, if I don't dose myself with salt, I'm fatigued 15 minutes into my workout because I workout pretty aggressively. I lift a fairly heavy weight and I run at a pretty moderate pace. I will tell you, if I do not dose myself with salt, I'm done after 15 minutes where if I consume a half-a-teaspoon of Redmond Real Salt before I workout, I can go an hour, an hour-and-a-half and I feel completely fine. I normally don't workout longer than that, but I never reach a point at the end of my workout where I'm like, man, I'm not feeling very good. If I start tapering down where I don't feel as good, I'll just add a little more salt and, boom, right away I feel pretty much better. The effects are pretty quick when you do it.

So the chronic benefits, you kind of touched on, are when you're sweating, you're sweating more than just salt out. Most people don't realize that a lot of

minerals are actually lost in sweat. One of the other minerals that is lost in a very significant amount is iodine. We lose about 50 to 100 micrograms of iodine, through sweat, per hour of exercise. Redmond Real Salt has good amounts of iodine which is why I use that salt. Most people don't really -- sea salts basically lack iodine. They have virtually none. I have a cool nutrient table in the book that reveals that.

**[0:30:28]**

But the chronic effects of making sure that you're replacing that iodine that you're losing in your sweat by using good salts, is that you are potentially avoiding iodine deficiency and hypothyroidism. The thyroid controls your metabolism, so you can have literally hypothyroidism and a lower metabolism by not consuming enough salt. You're exercising, you're sweating out all this iodine, and you're never getting it back. That's why people who exercise a lot can feel fatigued right after a while because they're sweating out iodine and they're never replacing it back. So that's one type of chronic effect that can happen by not getting enough salt.

And as you touched on, adrenal glands, the adrenal gland actually is the highest gland of vitamin C, very important for adrenal function. In order to absorb sodium in the body, vitamin C is brought in with sodium, so in order to absorb vitamin C in the intestines, sodium drives vitamin C absorption. It also drives vitamin C into our bones, into our brain and probably into the adrenal glands. So that's one way of getting enough vitamin C into your adrenals, making sure they're working well is by consuming enough salt. The other factor is when you're in a low salt diet and not getting enough salt, aldosterone levels have to continuously be high and that has been shown in animal studies at least, to lead to adrenal hypertrophy and eventually insufficiency. So not getting enough salt can absolutely cause hypothyroidism, a reduction of metabolism which is obviously going to be a reduction of energy -- who wants to workout when they're hypothyroid -- and a reduction in adrenal function.

The acute effects of salt are very, very intense. I have a new respect for Ancel Keys because -- I mean, I used to demonize the guy a little bit, but I have a new respect for him because when I found one of his studies published, I think it was in 1940s, and he actually tested a low salt diet versus a normal salt diet versus a high salt diet in people who were working in the heat. What his study showed was that people who were following the low salt advice, they actually had a higher core temperature, body core temperature. They had a tenfold increased risk of heatstroke and circulatory collapse and nausea and vomiting and things like that. He had this study back in the 1940s that literally proved that if you're working out in the heat, that low salt is terrible for you. It literally causes heatstroke and circulatory collapse.

The reason why salt cools down our body is because we sweat in order to thermal regulate. Sweat production goes up the more salt you consume, so you can cool down quicker by consuming more salt before your workouts. That's one of the benefits, is literally you are not as hot and so you can work out, obviously, longer, the cooler you are. So salt cools you down. It also is one of the best vasodilators which can increase blood circulation, so salt is one of the best ways to increase blood circulation in your workout. You're oxygenating the tissues better, you're moving lactic acid quicker by consuming salt before you work out. So there's another benefit. It also lowers heart rate and so you can work out longer, harder, faster, at a lower heart rate. So there's another benefit of consuming salt before you go work out.

When you start piecing all of this together, you can see how chronically consuming low salt diets can lead to energy depletion and not wanting -- I mean, honestly, who wants to sweat out salt when you don't have enough in your body? There's probably a signal that's happening in the brain that say, "Don't move because you're going to lose this essential mineral that you're already deficient in."

Robb: Yeah, it seems like great survival mechanism because if you're already deficient then you certainly aren't going to feel chipper to go out and deplete it even further. It's funny, for years, I've never hesitated salting my food. I felt like I was adding adequate amounts and then I started hanging out with the guys over at Ketogains and looking at what they're doing. I don't need a ketogenic diet because I just haven't been able to make that work with my grappling. I'm at a 100, 120 grams of carbs a day and that seems to be a sweet spot between good cognition that I would get on a ketogenic diet versus having enough glycogen to do the grappling.

But maybe about a year ago, I started adding about half-a-teaspoon of sodium and I oftentimes throw in maybe a little bit of mag citrate with this, about 20 minutes before a workout. I put it in about a liter of water. It has been shocking, the difference that I've had in performance. I just don't get tired or even when I get tired, I'll be smoked but I'm immediately, two minutes of rest and I'm back to 90% of what my baseline was. My heart rate drops, dealing with the heat because I do mainly gi jiu-jitsu so I've got a rash guard and a jacket and pants. It gets hot. I just had a shocking improvement in my performance from doing that. Is that about the dosing level that you recommend, that half teaspoon, and is there much variability on that based off of body size and duration of training and all that?

[0:35:44]

James: You honestly got it perfect. Half a teaspoon of salt, a liter of fluid is basically what the average person is going to lose per hour of exercise, so you lose about 1200 milligrams of sodium per liter of sweat, and that is basically, half a teaspoon of salt contains 1200 milligrams of sodium. The problem that most people don't get is that even the salty sports drinks like Gatorade and Powerade, they only have about 300 to 350 milligrams. When you're sweating out 1200, where is that --

Robb: You're not going to get ahead of that, yeah.

James: So what I do, I don't put it in a liter of fluid. I do it a little bit differently. I will put my half a teaspoon of salt in a cup, and I'll do lemon juice, just a little bit above coating it, and then I'll add maybe two ounces of water. It's like a lemon shot. I just take it real quick. I will just drink to thirst, until I'm not thirsty. So however I do it, I was just finding that when I was adding salt to a liter of fluid, it tasted like I'm drinking sweat. Some people can handle that, but it was just mildly nauseating for me. So I just take it straight up all at once and then I'm done with my salt and then I'll just drink throughout my workout.

Robb: Okay, that makes fantastic sense, yeah. It's funny, it does taste like sweat and so what I've done is actually put the lemon juice in the liter of water and oftentimes a little shake of stevia just to get a slight bit of sweet with it, but the concentrate actually makes a lot of sense. Because part of the problem that I've had is I'm trying to time my hydration without filling up my thimble-sized bladder and then needing to run off the mat and go pee all the time, so I'll give that a shot. That definitely makes a ton of sense.

Doc, I'm trying to think of anything else that we didn't cover. We talked about the U-curve. We talked about -- oh, hey, could you talk a little bit about the Kempner Rice Diet story? I was pretty excited that you had dug into that. Denise Minger, I'm a huge fan of, and she's one of the rare people that had actually uncovered that. Could you talk a little bit about that? That makes the rounds occasionally within the nutritional circles. Could you put some context with that, with regards to sodium intake and whatnot?

James: Yeah, absolutely. I'm a Denise Minger fan as well.

Robb: Okay, great, great.

James: She unraveled it and I think maybe I went a little bit deeper. That's my own bias. Because she was under the impression that it did work but that's just what his anecdotes were saying and so when people actually tested his diet, other better studies showed that Kempner was saying that this -- well maybe let me take a step back. What Walter Kempner -- he kind of stole the idea from a few other

scientists earlier on in the 1900s, basically to not tax the kidneys, we need to consume low protein, low salt, low fat, low everything which is about the worst advice you can give anyone. He believed that the kidneys, basically it's work on the kidneys to metabolize any type of substance and so he recommended more than just low salt. It was low everything but, but it was somewhat high in sugar, it was somewhat high in fruit juice, but it was only consuming maybe about a liter, a liter-and-a-half of fluid per day, and it was high in rice. So it was called the Rice Diet. It was basically rice and fruit juice and literally up to, people could consume on this diet up to 500 grams of sugar. The average person was consuming about 100 grams. He was saying 60% of his people were having dramatic reductions in blood pressure and their kidney disease wasn't as bad and their heart size would go down and, again, all anecdotal.

What ended up happening is others would test it and they actually showed that it wasn't the low salt part. Actually the low salt part of his diet made things worse. People actually died on his diet. I kind of revealed that in the book as well, that people were dying of salt deficiency on the Kempner Rice Diet which is obviously not a good thing. What ended up happening is when others tested his diet, low in protein, low in salt, they were only seeing about maybe 25% of people were having reduction of blood pressure and yet they were having all those side effects and potentially even dying. So the Kempner story is interesting because a lot of people cling onto that and use that as evidence that, well, sugar isn't bad because Walter Kempner told people to eat tons -- and carbs aren't bad because Walter Kempner's low-on-salt rice diet reverses hypertension, heart failure and kidney disease. It was super high in sugar and super high in carbohydrate. In fact, when it was tested in better studies, that's not really the case.

**[0:40:56]**

So I was really happy I tackled that story because I think some things were a little bit -- I guess when you only get one side of the story from Kempner, you're of course going to get the more biased and more positive effects of the results of his diet. So I was happy to find other studies who tested it that showed significant harms and significantly less benefits.

Robb: Yeah, I was super impressed with your treatment of that. I was just incredibly impressed with the whole book, but that actually stood out, an incredibly thorough treatment and again, pretty darn objective. You just let the data speak for itself. Yeah, I was just so impressed with that. Doc, maybe wrapping all this stuff up -- and you have all these recommendations in the book, I cannot recommend *The Salt Fix* enough. We'll have links to the book in the show notes. What are the approximate sodium intake levels that most folks should be looking for on a day-to-day basis?

James: Yeah, so it certainly depends on their level of activity and, like you said, nicotine intake, caffeine intake and let your salt cravings drive you towards the salt that you need. I always go back to the fact that the Japanese and the South Koreans were literally living the longest. They consumed the most amount of salt. It just blows my mind that we would ever demonize it when you actually look at it from a population standpoint. Even the Mediterranean diet is high in salt. It's high in seafood and clams and olives and cheese and all these other high salty foods. So it seems that most people who are consuming between one-and-a-third teaspoon, even up to two-and-two-thirds teaspoons of salt, are at the lowest risk of heart disease, strokes and early death. So that seems to be the sweet spot.

Robb: Fantastic. Okay, Doc, so where can people track you down on the Internet? I know that people will want to connect with you. Do you have a preferred social media platform? Where can folks find you?

James: People can buy the book on [thesaltfix.com](http://thesaltfix.com) or on Amazon. They can find me on Facebook or Twitter. My Twitter handle is @drjamesdinic. Instagram, my handle is the same, @drjamesdinic.

Robb: Awesome. Doc, it was such a huge honor having you on the show, really, really one of the best books I've read, in memory, on nutrition. Again, maybe it's catering to my geeky bias, but whenever anybody can unpack governmental collusion with big business and tie some evolutionary biology into it, man, I'm hooked. You did an outstanding job on the book. I've been buying copies and giving it to people like a maniac, so, congrats on just a fantastically done work.

James: Thanks so much, Robb. That means a lot. I appreciate it.

Robb: Awesome. Well, look forward to hopefully meeting you in person. We'll have all of this information in the show notes. Thank you again for being on the show.

James: Thanks for having me.

Robb: Okay, take care.

James: Bye-bye.

**[0:44:02] End of Audio**