Paleo Solution - 204

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Robb Wolf: Howdy folks, this is Robb Wolf. This is episode 204 of the Paleo Solution podcast and we actually have somebody on today, John Kiefer, a world famous author of Carb Night, Carb Backloading and dude, you probably walk around about204 pounds right?

John Kiefer: Yeah actually, I think I'm like 210 right now.

Robb Wolf: Okay. Okay.

John Kiefer: Yeah.

Robb Wolf: So we'll fake the episode number and pop it up so it matches your body.

John Kiefer: Yeah. Unfortunately, you can just put it in later so that it comes up as episode 210.

Robb Wolf: Perfect. Okay, okay we'll do that.

John Kiefer: But I'm getting back to 6% body fat so if you subtract those we're at 204.

Robb Wolf: There we go, there we go. So yeah, we're talking like lean body mass or something like that. Perfect. Hey before we totally jump in on this, my last show I forgot to introduce our show sponsors so let me hammer through that really quick. FrontDeskHQ.com, FrontDesk is your mobile-based solution for service based businesses, dog walking, car washes, crossfit gyms, yoga, Pilates, you name it. If you extort people for money in some sort of service-based deal then Front Desk HQ is the place to go. You can schedule a demo with them super easy and that will pretty much sell you on that produce.

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We got the Performance Menu Journal of Nutrition and Athletic Excellence. Go to PerformanceMenu.com, there are two different

subscription kind of categories. $30 a year, $100 a year, the $100 a year gives you all the access to the back issues, 15% in the Catalyst Athletic Store.

Finally MasaMeats.com. Masa Meat is who I get my grass-fed meat from. They are based in Northern California, can ship through the United States. Lots of people make good meat but Masa Meats is literally the best grass-fed meat I've ever had so check out Masa Meats. If you missed any of that, you can go to RobbWolf.com and check out the podcast and we have banners for all of that crap. Okay, dude.

John Kiefer: Wow.

Robb Wolf: So yeah, holy shit like some people so we get these podcasts transcribed and some people they ping me and they're like you know, when you go on and on about your show sponsors and there's literally like eight pages talking about the sponsors. It gets a little bit long in the tooth so I'm trying to streamline that stuff. But so dude, you know, we had Dr. Perlmutter on a couple of podcasts back, very, very popular show. Got some people kind of whipped into a ketogenic frenzy both good, bad, confused and Kiefer pinged me not too long after that and was like hey man, I've got some stuff that I kind of wanted to talk about and so you know, and before we press play on this you mentioned this concept of keto adaptation. Let's talk a little bit about that and some of your observations on the keto adaptation story.

John Kiefer: Yeah. You know, to me and this is what I was saying before we started recording, at its best I really feel like it's just bad nomenclature. It is an attempt to bring in this, you know, some kind of related research and extended to human performance and I think it's very inaccurate to say the least.

Robb Wolf: Well let's go through what the – you know, so like a good friend of mine Peter Attia has done some pretty remarkable documentation on himself in going through what he would call like a keto adapated protocol. He went from being pretty overweight, training three or four hours a day like he is a training machine. The guy spends more time in the pool than I do like sleeping so you know, but he had some serious issues with being able to lean out despite his enormous work volume. Kind of started eating what I think most people would consider more paleo, low glycemic load but still not really concerned about macronutrient breakdown particularly and he saw some body composition improvements with that then finally went ketogenic and initially saw what we would normally expect some drop off in anaerobic performance. After a couple of weeks,

he saw his aerobic performance get back up to and maybe even beyond where he had been previously like where his lactate threshold would kick in was actually extended. And then over the course of about two years of tinkering with this, he feels like he's back up to largely having both aerobic and anaerobic capacity he had before.

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He does play around with like some super stars. He plays around with a little bit of post workout carb repletion to get the muscle glycogen up and try to partition nutrients into the muscles so that we're not getting too much hepatic glycogen repletion that would potentially kick us out of ketosis. But would you say that's a fair shake of what the bare bones of the keto adaptation kind of story is or do you want to expand on that before we talk about maybe some of your gripes with that terminology?

John Kiefer: Yeah. No well yeah, I think that's kind of an accurate description. You know, Peter Attia I love his work. I unfortunately haven't had a chance to converse with him yet because a lot of what he does is you know, essentially principles of like carb backloading and carb night stuff that I have been playing around with for at least a decade now, at least carb night. So a lot of those things are accurate. You know, where I have the problem is without the clear-cut studies but there really aren't any but some of the best we have for keto adaptation and the reason I have a problem with the name is it's not really keto adaptation. You know, Dr. DePascuale I think had one of the best phrases and it was kind of the de facto phrase for a ketogenic diet for a long time and it was fat adaptation.

Robb Wolf: Uh-hum.

John Kiefer: Even that in my opinion is incorrect because when you think about the average person or even performance athlete, it's not as if the default cycle for human metabolism is carbohydrates. I think you have a very, very hard time proving that. So really what we're doing is we're breaking the carbohydrate adaptation and we're getting more down to baseline and when you get there then you can start asking the interesting question so what is it that our muscles or heart or you know, particular muscular systems are using for their preferred energy source. Once we get there then we can really start asking the interesting questions like okay how can we manipulate carbohydrates, at what time during the day and what day to extend whatever type of performance it is whether it's endurance performance or whether it's power production or whether it's strength endurance.

So it's all just to me the really big fundamental problem is nomenclature and what that means and what that leads people to believe. Because you

know, now people are like psychotic about oh, I've got to be ketogenic all the time. I've got to be in ketosis. You know, it makes my muscle more efficient. If you look at the rat heart, you get 30% great efficiency and all those things I think are very, very confusing to most people because there's a ton of information that's left out that shows a lot of that stuff doesn't extend to your skeletal to muscle tissue. You know, it's not equivalent.

Robb Wolf: And John, maybe something worth mentioning here is we could have a let's you know, in quotations like a carb adapted athlete and we give that individual some ketone esters for example.

John Kiefer: Right.

Robb Wolf: So this person has never really trained in a ketotic state but we could throw some ketone esters down this person and they will preferentially utilize those ketones and we get this benefit from the ketones without a specific adaptation period. So I think that your point about this becoming more say like upregulation of lipolytic enzymes and smart partitioning and utilization of glycogen is really a well-made one because we could with just the application of just ketone esters alone or even just MCT oil we could see a really significant --

John Kiefer: Yeah.

Robb Wolf: - uptake in ketone body production and then we get a mitigation of glucose being utilized by the brain. We get some nice benefits with heart musculature. It's going to used --

John Kiefer: And the diaphragm

Robb Wolf: Yeah and the diaphragm and all that stuff. So I think that that's actually a really good point and as you were talking it just occurred to me it's like okay yeah, we could apply say like a ketone ester to somebody and see some immediate potential benefits particularly on the longer time scale of physical activity.

John Kiefer: Yeah and it's interesting you say that. You know, if you just kind of go backwards, you should be able to -- like that's a perfect experimental paradigm because you should be able to say okay let's look at where are the enzymes most highly concentrated that use ketone for rapid energy production.

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And as far as muscle tissue goes it's the heart and the diaphragm. Any muscle tissue that's made for sustained constant contraction so you know, the heart is constantly beating and the diaphragm's contracting and relaxing. Skeletal muscle tissue it turns out has very low concentrations of three-hydroxybutyrate dehydrogenase, which is one of your main enzymatic pathways for ketone production. It goes up when you are ketogenic for a long period of time. You have higher concentrations in the heart and diaphragm and actually your skeletal muscle tissue at that point will shut off ketone metabolization. It almost completely preserves ketones for heart, diaphragm, brain, nervous system tissue.

So the experiment where you can get ketones and you get immediate boost in endurance capacity really shows how it's that the heart and those tissues that need to run more consistently and can get a greater efficiency out of it that ultimately results in performance. So you know, it's nice you have that immediate effect you can see and you also see that long term.

Robb Wolf: Nice. So you know, some of the and this is maybe going a little bit tangential but you know, upfront and then I'll probably try to wrap this up again because oh man, people love to make this stuff a black and white thing. So we had Dr. Perlmutter on here, he's a top of the food chain neurologist published in the journal of neurology at the age of like 19 like I still think he had like you know, amniotic fluid on the guy when he published and so a really legitimately brilliant guy. Has been both right at the top of the research scene and the clinical scene and he's doing absolutely amazing work in neurodegenerative disease using ketogenic diets to treat this stuff and we're looking at everything from Parkinson's, Alzheimer's, dementia, I think possibly even Huntington's disease that may benefit dramatically from this stuff. These are things that we have literally zero effective pharmacological intervention.

John Kiefer: Right, right.

Robb Wolf: Like our pharmacology sucks in dealing with this stuff. It's incredibly expensive. If you throw into this traumatic brain injury, post-traumatic stress that we're seeing out of the military and the benefits that a ketogenic diet could have with this and I would actually argue potentially acyclic ketogenic diet being maybe even better because of hormetic stress response but that's still a ways to be seen.

But anyway there's a massive amount of morbidity and mortality with this. People are dying. People's quality of life are less and we have this

great guy who's gone out here and is really like blazing a path in some effective treatment protocols. I think we need to celebrate that and hold this guy up and really rally around him but we need to also understand that that is not the only way to skin the cat or depending on what the situation is that that may not be the only thing that we do. At the end of my podcast with Dr. Perlmutter, I asked him hey you know, I do Brazilian jujitsu, should I still be doing my post workout yam or sweet potato and he's like no, no, no, you're not keto adapted. You need to do more work with that which I just found a damnable time with glycolytic-based activities to truly get fueled that way. I need some sort of consistent carb intake whether it's like a carb night or a carb backloading.

For me actually lately like I've just been eating more carbs in general and I've been doing really, really well with the jits and so that's just been where my level is. But ironically it's still not like high carb. It's like 250 maybe 300 rounds on a training day and about half that on a nontraining day. But you know, folks want to make kind of a one-size fits all story out of this and I just can't emphasize enough that that's probably not a good thing, that we need to understand what therapeutic interventions are. We need to understand individual traits and I just wanted to get that out there early so that people keep it in mind even though they're going to forget it and want to turn it into a religion anyway. Okay. Sorry.

John Kiefer: I was going to say that that's perfect because that's exactly what I say. You know, there's no one perfect diet for every single person you know, but for every person, there's the perfect diet for the perfect time.

Robb Wolf: Right, right.

John Kiefer: You know, depending on what they need. It's so interesting you bring up the ketones to use to treat Parkinson's and Alzheimer's we have all these conditions and that struck me for the first time. This is what got me on this whole tirade about talking about things appropriately and using the right titles because you know, a paper published recently is like degenerative diseases of which ketones area novel therapy. You can think about it that way and you can think about when you put these people on a ketogenic diet and you start to see these remarkable improvements or if you flip the coin, you could actually say carbohydrates as a potential source of neurodegenerative diseases.

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Robb Wolf: Is it neurodegenerative toxicity? Yeah.

John Kiefer: Yeah, yeah.

Robb Wolf: Totally.

John Kiefer: Because you know, you take that, you take carbs out of the system you get a highly ketogenic diet you know, one specifically that's high enough in fat for that continued ketone production and you see all these huge benefits and really the way that we should maybe be looking at it is well the carbs are poisoning us. You know, ketones aren't a novel treatment, or just taking all the toxins out of the system and lo and behold things start to work well.

Robb Wolf: John, you know, that was one of the things and I think that you know, it's kind of the forest trees kind of things. Like where I'm at with the carb toxicity story, like you know, we've got some examples like the Catavins, we've got some Okinawans, you know, as I've evolved over this thing, I kind of lean in this direction of excessive calorie load probably the carbohydrates thing, probably the big factor like neuroregulation of appetite. But this thing of looking at mitochondrial dysfunction, damage to the mitochondria and then we start getting problems in there in which we are not able to handle the carbs in.

John Kiefer: Right.

Robb Wolf: You know, relative to fat. What do you think about all that? Like that's kind of where I'm at. I've followed a lot of stuff from like Stephan Guyenet, Chris Masterjohn, Matt Lalonde has bludgeoned me pretty good with this stuff because I definitely have been much more… You know, it's interesting because again when you see somebody very, very sick, and we use this therapeutic intervention like a ketogenic diet, low carb diet or some sort of cyclic carb approach and you see such enormous benefit, then I think it's easy to say okay, the carbs were the causative factor. But can we completely in an airtight fashion say that's it or you know, is it just that we're seeing a tremendous therapeutic benefit here but as far as a mechanism of causation we may still kind of have to go back to excessive calorie load, mitochondrial dysfunction because of that, carbs and refined carbs, refined food probably being hyper palatable and we're over eating that. We're overwhelming the mitochondrial substrates and whatnot. But where are you at on that story?

John Kiefer: Well as far as mitochondrial health and everything, I've been on that bandwagon for some time you know, kind of curious about what are all the potential avenues there because Dr. Bruce Ames who I've talked to,

he studies tumorogenesis in children and he's been studying that for like you know, 60 years.

Robb Wolf: And all vegans should talk to Bruce Ames, it would curl their toes.

John Kiefer: Yes.

Robb Wolf: Yeah.

John Kiefer: Yes, yes exactly. And you know, his take was and he came up with this I think about 40 years ago. He started his well you know, all life span is really you know, longevity for an organism is really heavily dependent on the health of its mitochondria. He's been saying this forever and it was really you know, only recently we started to see that yes, you can make a very strong case for that and I think the problem was for most people to say okay well then what's causing the mitochondrial damage. You know, I think Dr. Ames was way too simplistic. He said if you take seven vitamins and seven minerals, your mitochondria are super healthy for life and nothing else matters. I think that's simplistic. Argument really worked against him to get people to look at that more seriously but now we can see all the other mechanisms. If you eat a lot of carbohydrates and you're in that glycolytic pathway more often, no matter what type of exercise or activity, you always have a higher lactate production and you'll always have some calcium dysfunction within the mitochondria and the calcium-sodium pumps that go on there. You can actually start to cause a lot of damage.

So now, we've elucidated all these mechanisms so I think there's a very strong argument for mitochondrial health in the overall health of the organism and I also think we're getting to the point that you know, it's one more piece of the puzzle. We can say carbohydrate diets if that is the predominant fuel source and you're not using those in an effective capacity so I want to take exercise out of this or the right type of exercise even, you know, I don't think endurance exercise, you need carbs for.

So if you have these carbs and you're using them in the wrong way you are causing potential degradation of the mitochondria. So you know, to me I just think with everything that I've seen and all the research that I've been looking through, it's just one more nail in the coffin of using carbohydrates inappropriately and by that I mean most of the American public should not be eating a lot of carbohydrates very often.

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Robb Wolf: You know, is this in part because we're not sleeping enough or too sedentary we've got too much stress, we've got gut dysbiosis and so you know, again like people will look at like the catavins, the Okinawans like some people that eat a lot toxicity diet relative to like pulling gluten out of the diet and stuff like that.

John Kiefer: Right.

Robb Wolf: But they seem to motor along pretty well on a reasonably high carbohydrate level like anywhere from like 60% to 70% of total carbs good longevity. But we also you know, the refined element isn't there, refined seed oils again sleep, vitamin D like all these extenuating factors that's some of the stuff that I've been trying to wrap my head around is you know, if these other factors are pretty well squared away are we okay? You know, or is this just an across the board kind of thing and that's something that's been hard for me to really pin down. Like my gut sense has been that a part of the reason why say like a westernized population might benefit from significant carbohydrate restriction, is because we don't sleep enough. We have this wacky gut dysbiosis. We're being born by C-section and not vaginally. You know, all these different things that can lead into systemic inflammation, insulin resistance and then we need to…

It's almost like you know, in the case of PKU, phenylketonuria you have a genetic aberration that causes the individual to not metabolize phenylalanine and so the phenylalanine accumulates in the body and can become toxic and can kill the person so we do a low phenylalanine diet. So are we epigenetically tweaking people with low vitamin D, stress, bad sleep, etc. to make them carbohydrate intolerant. You know, it becomes somewhat superfluous as to whether or not there's carbohydrate in the diet. We've already got the deck stacked against us because of these other factors and some people are really going to need to limit carbs in the same way that people with PKU are going to need the limit phenylalanine. Like what do you think about that?

John Kiefer: Yeah. This is pretty much like preaching to the choir here.

Robb Wolf: Cool. Cool. Cool.

John Kiefer: Yeah because so except you know, you're the first one to actually introduce this from the opposite direction that I would. Mine is that carbohydrates, you know, regardless if you look at everything gut issues, overall health problems, sleeping problems, stress problems of our western culture, my take on it are those are so devastating because of

our diet. So our carbohydrate based diet is actually causing us to have – we're basically poisoning ourselves on a regular basis. You know, we've got this flood of carbohydrates depending on which one fructose, glucose is being metabolized differently in the liver which could cause essentially low grade liver dysfunction and how it's metabolizing things. We could get these end products that aren't utilized very well, the body has got to figure out how to dispose of all those. We've got all of these going on and so my take is the carbohydrates are kind of already giving us this low grade sickness and then if you pile everything else on top of it, the body just can't handle it.

An interesting research with gut health and carbohydrates is they actually took celiac patients who had gone into total remission and they gave them a carbohydrate and gluten load with a special enzyme that degraded all the carbohydrate before it can actually get to the intestinal tract. What they found was the end result was the gliadin protein fractions were intact, all the carbohydrate had been basically destroyed and the celiac patients had no inflammatory reaction whatsoever. So in that case it almost looks like carbohydrates are a necessary trigger to get some sort of complication out of whatever it is that might be that you might have a major allergy to right now, really the lighter fluid on that could be the carbohydrates. It's really that the body can handle certain things and like you said you've got the hormetic response of stress and there's probably a hormetic response to toxins that we get in the environment that actually help the body to evolve at one point. You know, you got poisoned a little bit every once in a while. The body learned how to handle it, how to adapt to it and made it more robust.

But now we're just constantly poisoning ourselves and the body can't recover. So from my perspective, it's the carbohydrates that are causing the systemic poisoning where the body can't handle all the other stressors. You make a very compelling argument for the opposite point of view which is well it's everything else that's causing this low grade poisoning to the system to where it can no longer handle carbohydrates. I think whatever perspective you come from, right now it will be hard to come up with any other argument for the western population other than we really need to limit carbohydrates in the diet. Because until we do that, we can't answer those fundamental questions.

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Robb Wolf: Well and you have a ton of people police, fire, military, medical who they are not going to be able to address their sleep.

John Kiefer: Right.

Robb Wolf: They're going to remain on shift work.

John Kiefer: Right.

Robb Wolf: We might be able to get their vitamin D up, we might give them an iPhone-based app where they can meditate five minutes a day and mitigate their stress a little bit. But the dietary intervention is really the thing that the people have the most control over and particularly in these really impacted populations and also anybody with new kids or something like that. Like if you're in a situation where you're just not going to be able to control your sleep environment and this was one of the things that I've seen almost cyclical battle on this thing is you know, I guess because that's so much of the time that I spend is with police, military and fire you know, working with the risk assessment and all that. We see these people that are really metabolically broken, low androgen levels, low vitamin D levels. They've got all these other cards stacked against them and it's like okay man the one thing that we can do you know, is we can lower your carbohydrate load, get some better fats, get some better protein in there, mitigate the toxin load into your gut, maybe get you eating some fermented foods and like we can do that, but it can't get you off shift work. Like you know, --

John Kiefer: Right.

Robb Wolf: -- we could slowly start ramping up your vitamin D but this other stuff unless they're just going to shift career. But then all that does and I think towards the end of the podcast we'll talk a little bit more about how Kiefer is maybe shifting gears a little bit from performance orientation to more health and longevity orientation in the folks that he works with. But you know, okay so we move that one person out of that spot but then who else is going to step into the spot of being on night shift with the local police force. You know what I mean? Somebody else is going to do it and that's going to impact them and that's going to impact society at large at some point so.

John Kiefer: Yeah, it was interesting, there's a few fire departments in and around Phoenix that are using carb night with some of the firefighters. So I got to go on ride alongs with them and see what their day was like. You know, it's interesting they don't have that many calls that would be amazingly stressful like you know, major five alarm fires or anything. But just that broken cycle it's like you know, at least around Phoenix you know they're basically EMT/fire so somebody calls up and they feel like they're having a heart problem and really all they want is somebody to go take them to

the doctor to get their medication. You know, they're up in the middle of the night canonical and it just is so rampant and you know, exactly what you said they wanted to try something because they just felt like they were overweight and out of shape.

Robb Wolf: Right.

John Kiefer: Which is what got them on it. But like you said there's two environments that your body exists between that's the external environment you know, the world around you and the internal environment which is all the food and bacteria that you're accidentally putting into all that stuff that you have absolute control over. So if you can only control one of those environments, it makes sense you're going to try to – you want to hone in on the one that you can just fine tune as much as possible to try to handle the world around you. Whereas in the past you know, maybe during evolution that wasn't the case. You know, we had to adapt a different way. But now we have the ability to kind of within reason fine tune our internal environment to match our external environment. Whereas you know, back in the day we probably had to move somewhere else so that we could fine tune our external environment to match what we could get into our internal environment.

Robb Wolf: And you know, I think that this can get into some just so stories you know, talking about caveman and all that stuff.

John Kiefer: Uh-hum.

Robb Wolf: But I think it is intriguing that when you look at some of the basic anthropology about like the work week of a hunter gatherer and even just critters at large living in the environment the sun goes down, they go down or unless they're nocturnal then they get up.

John Kiefer: Right.

Robb Wolf: You know, those are some kind of embedded elements that are just kind of part and parcel with our physiology. It's clear whether we're talking human animal or other animals that each one of those factors that we tweak from photoperiod to changes in diet, changes in activity level or changes in socialization, each one of those kind of counts as a potential stress and it's cumulative effect that then we need to start figuring out okay how are we going to the deal with this.

[0:30:21]

I just had my friend John Durant on the show this last go around and he wrote a book the Paleo Manifesto. In the beginning of the book he used

this example of this guy from the gosh I want to say the Boston zoo maybe it's the New York Zoo but he tells the story about this guy who was eating like fiber bars but is having, eating a low fat diet, you know, all this stuff should be healthy but was having neurological conditions, was picking his hair out and all this stuff and it ended up being like a gorilla. The way that they fixed the gorilla was starting to feed the gorilla like lettuce and celery. They put them into a more naturalistic environment and so instead of a concrete floor it was dirt floor and way bigger enclosure and more critters to play around with and everything and lo and behold feeding them, changing the photoperiod so that it cycled more with the seasons instead of it just being a really static element, a bunch of the health problems went away. The GI problems went away, the clear kind of psychological distress that this gorilla was under seemed to go away quit picking his hair out and all that stuff. You know, these kind of OCD type of behaviors.

So I think again if we lived on a desert island and we went to bed when the sun went down and we got up when the sun came up and we had low stress, but the only thing that we had to eat were Wheat Thins, the likelihood of the Wheat Thins completely eviscerating us are probably a lot less than if you are a night shift cop whose got three kids at home and you're under financial stress and then you're dealing with a bunch of thugs all the time. You know, the firefighters I would say in a lot of ways almost had it worst. Like here in Reno, I want to say in the 48-hour shift it is not uncommon for these folks to go on 35 calls --

John Kiefer: Wow.

Robb Wolf: -- in a 48-hour shift. So I mean they are just go the whole time and when they finally do lay down and get a little bit of rec time, they get five minutes, ten minutes of rec time and then boom they're off and running again.

John Kiefer: Yeah. Yeah. Like I said, unfortunately you've made a compelling argument for the other direction so I'm going to have to… No, I mean it's like so hard core on just because we've got all this great science behind carbohydrates and how they can strip metabolism you know, it's probably my own internal prejudice at this point that's just pointing everything towards carbohydrates. It's like let's get that fixed and then we can figure out what's the next big one that needs to be fixed. You know, like you said in some populations they're just the big one is something we can't fix.

Robb Wolf: Right.

John Kiefer: You know, you really can't do anything about their sleep cycle. It's just the nature of their job.

Robb Wolf: Right. You know, I think you make a great point which is that we're not –I think that we could legitimately step back and say okay we're not 100% sure whether this is coming from whether it's the baseball bat to the back of the head or the front of the head that's the worst problem, you know, but --

John Kiefer: Right.

Robb Wolf: -- the fact that we're getting hit in the head with a baseball bat from both directions there's a problem here and so what do we do to address that. I think that that sometimes where people will lose their minds with me is that I'll advocate a higher carb intake for like MMA fighters and stuff like that. But then I'll turn right around and you know, if we've got a firefighter that again is doing 35 calls in a 48-hour period and has all kinds of other life stress, they maybe shouldn't be eating a low carb diet or a high carb diet all the time. But then I'll flip that right back around and say maybe they shouldn't be ketogenic every day all the time too because of cortisol issues and thyroid dysregulation and stuff like that. So we need to think about what's their strength and conditioning look like, does this person need to be doing, do they need to be training for the crossfit games or should they lift some weights and do some more moderate intervals and partition carbs post workout or maybe the way that you recommend in a carb backloading kind of format. So that we're getting some advantage on noninsulin-mediated glucose transport and stuff but we're still getting that insulin pulse. We're not overwhelming the system. You know, we're getting a hormetic stress response but we're flying under the radar of what's going to become an insurmountable stress that's already being added to a stressful environment.

John Kiefer: Yeah, yeah, it's interesting and you go to these other populations like Okinawa and I just wanted to come back to that because the interesting thing to me and what I haven't seen a lot of is I know they're healthy and I know they peter along for a long time and they've got a very low toxicity diet. White rice is one of the lowest toxicity natural foods that you can find.

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Robb Wolf: Well they do a ton of sweet potatoes.

John Kiefer: Yes.

Robb Wolf: Even in the literature on them, they've done some interesting stuff indicating that as they shifted away from the more traditional sweet potato based diet to a white rice based diet, they show health problems. It's pretty interesting.

John Kiefer: It's interesting.

Robb Wolf: Yeah, yeah.

John Kiefer: Yeah and you know, my curiosity there is like what is the genetic factor.

Robb Wolf: Right.

John Kiefer: You know, we can look at there's - I was just reading this in I think it was Scientific American maybe. It was a really interesting research done recently on one of the genetic markers for the function of our immune system and unfortunately I can't recall it all right now. But basically in humans there's four different types, sub types and they found that in ancient mummies the ones that had what they assumed is the most ancient subtype even in the northern populations where they ate primarily meat and fat they saw signs of atherosclerosis which really surprised them. So then they went back and they tried to look at correlate these four different mutations with longevity and it turns out if you have that the oldest allele that you are going to die six years earlier than everybody else. So there is like a huge genetic factor that is way outside of what most people consider looking at for just longevity and health. So the question is in that Okinawan population, what are the defining characteristics that we haven't identified yet. Is it purely diet?

Robb Wolf: Right.

John Kiefer: You know, it could well be. Is it lifestyle? Is it some adaptation quality that they've had from being on that same diet for so long? You know, we ignore all these things that's why I hate it when somebody says oh well obviously low carb diets aren't healthy and that's not the answer because look at Okinawa. That to me just doesn't even make sense, you know. We have such variety across human populations where you get one group, you put them on an extremely low carb diet and their LDL cholesterol like it goes through the roof. It's like well does that even matter and there's obviously some genetic trigger there causing it that we haven't identified.

But you know, at the same time we've been looking at so many of the wrong parameters for so long it's caused this unbelievable confusion

amongst health professionals and amongst the nutrition community and the performance community is still struggling with the idea that calories in, calories out might not be right. Here you are talking about some of these advanced concepts and like, oh you know, they're the most vocal in the web which unfortunately just confuses more and more people. It's this context that is really missing in the dialogue that's out there that's I think preventing us from moving forward.

You know, for example the idea of ketoadaptation to me if you're keto adapted, that means your muscle mass is no longer using ketones and they've shown that within two different weeks of being ketone adapted, your skeletal muscle tissue no longer uses ketones almost exclusively fatty acids.

Robb Wolf: Hmm.

John Kiefer: So you've already kind of muddied your main concept with this keto adaptation for performance when really what you're saying is well no we've made the body fat adapted and we've actually limited ketone use in skeletal muscle tissue. So what did we do? Are we ketoadapted or are we a high fat diet adapted and you know, little inconsistencies like that turn into huge snowballs that really to the layperson hurts. You know, it really hurts the credibility of anybody who's become too locked into a definition without explaining the four ramifications of that definition.

Keto adapted if you want to say keto adapted is possibly one of the ideal paradigms for let's say health and endurance training and here's why. You get higher stroke, higher stroke volume per unit energy in the heart. You get greater efficiency in your diaphragm. You get greater efficiency in neural capacity and neuron firing. But at the same time you're not using ketones whatsoever in your skeletal muscle tissue. You're relying on fatty acids and you will go glycolytic and you've got to have some glycogen stores for that.

You know, if you fully explain that, then I think you close the doors to some of the arguments that really hurt anyone perspective too much. Paleo the defining characteristic of paleo is definitely no longer this is how paleolithic man ate.

[0:40:13]

Robb Wolf: Right.

John Kiefer: You know, it's an unfortunate legacy of the name but the concept is okay you're sick, there's something that you're putting into your diet that's

poisoning you, let's find out what that is and we'll take that out and then maybe we'll get you back to a point of health where those things won't matter as much. You know, Jim Laird is my favorite example on that because the guy was terrified of gluten, which he should have been from what he went through and I finally talked to him when he was out at Paleo FX last time. I was like Jim you are so healthy, I will be you anything that you can eat a box of cherry turnovers and you'll be fine. He goes no man I can't do it. I can't do it. I know how allergic I am. I was like I'm just saying that, I think you were so sick that why you had such massive reaction. I'm not seeing any cherry turnovers every day but I bet if you did it once you wouldn't notice anything. He finally broke down and had a box of cherry turnovers and he text me the next day. He's like dude I haven't felt this good in weeks. I had an amazing workout no problems. Of course, he didn't eat cherry turnovers again for several months and I don't know if he has but it kind of just proves the point. We're so sick that for different people there's really different avenues of attack and I think the paleo name has caused some backlash against it unfortunately because of the name and what it implies. But it's really at its core no matter what a very, very sound principle of getting somebody healthy end of story.

Robb Wolf: Right, right. Just using that framework. Yeah, yeah.

John Kiefer: Yeah.

Robb Wolf: Yeah and you know, to the gluten issue like I would say that if I ate a box of cherry turnovers, I would probably decommission every bathroom in that house. But I will say this that if I've been sleeping well, if my training has been good but not over the top you know, I'm waking up and I have got an erection in the morning so clearly my testosterone is good and all that sort of stuff. If I go out to eat and you know, like I'll get a little gluten dose inadvertently because I really don't play with those waters at all, but I'll go out and I'll be like I've got a little dose, you know, it won't be bad in the morning. I'll be fine like I'll have a little something. But if I've been on the road for a week time zone changes.

John Kiefer: Right.

Robb Wolf: You know, all the stuff going on, bad stress, bad sleep, and then it's almost like if I am breathing the air then I get a gluten dose you know, and like my guts --

John Kiefer: Right.

Robb Wolf: -- are destroyed for three or four or five days. And I know even for myself and I'm probably like one of these canary in the coal mine types that like I'm going to be the first one to die from whatever it is that's going to --

John Kiefer: Right.

Robb Wolf: You know, in toxicology, there's this term LD50. You take a toxicant expose it to a population of animals and then when 50% of them died then you called it the LD50. I would be the first one to die, you know. But I've noticed in myself that my ability to, my antifragility, my robustity whatever you want to call it, if I'm taking care of all these other lifestyle features, then I notice that I'm a little more robust on the diet. And then the other side of that is that if I'm pretty solid on the diet then I'm a little more robust on the lifestyle piece. If I miss some sleep, if I'm training really, really hard, I've been doing four or five days a week of Brazilian jujitsu a couple of days a week of weights and at 41 years old I'm motoring along with that. I have to listen to my body and if I'm beat up then I take a day off or I do a recovery day or something like that. But it goes pretty well.

But if I start making inroads in the sleep and the food and I'm not taking my vitamin D and stuff like that then I definitely see like the wheels start falling off the wagon.

John Kiefer: Yeah. Yeah. You know, it's really a matter of how many stressors have you piled on and at what point can your body no longer handle it. That's the problem with some of the "young experts" we have that are in their early 20s and they're running around the internet well I do this and I do this. It's like man when I was 20 years old, I did stuff that would kill me today.

Robb Wolf: Right, right.

John Kiefer: You know, there's no way I could go in and start doing three hour workouts again and sleep three or four hours a night and go teach all the next day and have to deal with students that I hated and then go take my tests and then go back to the gym and repeat. You know, there's no way I could do that right now. What I wish I would have understood back then was that had I decreased the stressors in my life, I probably would have gotten much better results all the way around the board.

Robb Wolf: Right.

John Kiefer: You know, I would have gotten better training results. I would have gotten better personal results. I would have gotten better academic results. So you know, it's just this unfortunately, you don't understand how fragile your body is until you've actually caused so many problems that it's hard to fix.

[0:45:11]

Robb Wolf: Right. What do they say youth is wasted on the young?

John Kiefer: Yes.

Robb Wolf: Yeah. Yeah. If I knew in my 20s what I know now I could have been something. I could have been a contender.

John Kiefer: Right, exactly.

Robb Wolf: Or I would have just been incredibly average like I already am, but… So man you've done a lot of work with some high end athletes particularly in the physique and powerful lifting scene but again before we – well and to that point you've had a ton of success. You have some very high level people, very credible people that's singing your praises about the technology that you've used on stuff carb night, carb backloading and being able to tweak and modify things to help folks. But you've been feeling a bit of a different calling. Do you want to talk about that a little bit?

John Kiefer: Sure. You know, oddly enough it's not really like when I wrote Carb Night back in 2004 going out to 2005 like really my main goal of that book and you can see it if you read the book you know, I'm really speaking to the average person.

Robb Wolf: Uh-hum.

John Kiefer: I had had so many friends and you know, in the performance community I had gotten to the point where I felt like it was kind of easy because you're working out so much, you make a lot of mistakes and still look pretty good and be pretty healthy. But I had a lot of friends who were older, family members and friends my age who were starting to see the problems that most people have. They're gaining fat and all this. And I really wrote Carb Night as a simplified version of what I use performance wise to just help people lose body fat. At the time my limited knowledge was that if you do everything to reduce body fat and save muscle mass, you're just going to be healthier end of story and then we can start looking at all this other stuff later.

Carb Night just didn't take off. You know, I was really naïve. It was like one of those if you build it they will come. Well nobody came and that went on for five or six years and then I decided to make another go of it and oddly enough where I found out I can get a lot of traction was in the performance community because those people will do anything to get that next 2% of performance out of themselves

Robb Wolf: Right.

John Kiefer: So you know, it's kind of this it drove it backwards. You know, I got in the performance community and then you know, people kind of stumbled on Carb Night because I wasn't really talking about it very much so they went from Carb Backloading to Carb Night. And then their friends who had seen results on the gym were the ones who were on the treadmill all the time. So then it kind of leaked into the lay population and Carb Night actually now as far as sales and volume is way outpacing Carb Backloading. There's been just this big shift I get a lot more questions about well is this good for diabetics, is this healthy for this, is this what's going to happen with my cholesterol levels.

Then Dr. Rocky Patel has made like a really big push because he was just sold on Carb Night. He used it on himself for a couple of years and did the carotid artery scan. Before Carb Night you know, his carotid artery was almost 50 or almost older and he's in his early 40s and then after Carb Night his carotid artery scan went back down to that of a 20 year old.

Robb Wolf: And what's interesting though is that his LDL particle count went up.

John Kiefer: Yes exactly. That's what I was talking about earlier.

Robb Wolf: Yeah.

John Kiefer: So you know, he was like okay and that really changed his perception of oldest stuff we're looking at and is it the wrong stuff. So he's been using Carb Night a lot with very metabolically deranged people. You know, I was in Phoenix last weekend and we sat down to dinner and she's talking to me about somebody who came in and they're 450 pounds. They started paleo actually and got down to 380 and stalled and their blood work looks pretty good and they were complaining about stalling and he brought him in and said here's what I want you to do. Broccoli, beef, butter for the next two weeks and then you're going to eat some carbs. And this guy came in and his blood work is even better now after just two weeks of kind of using that paradigm.

So that's really where I want to make the major push because I'm looking at it from my perspective. My perspective at this point is I'm healthy, I'm still young, I'm still very productive and that there's all these people in the United States who are getting incredibly sick, they're getting incredibly ill and it's not all their fault. They're getting like very bad advice. The food that's available to them, it's very low quality and it's exacerbating this problem.

[0:50:01]

You know, eventually I'm going to be taking care of them financially because you know, our industry as a whole and our government as a whole has made them very sick. I would rather them have a more enjoyable productive life because it takes the burden off of everybody and you know, it prevents the United States from becoming insolvent in healthcare bills.

You know, I remember just the feeling of being in a society where people are healthy weight and they feel good. It's so extremely different. When I was in Vienna, it's just such a different atmosphere anywhere you go and the population there is the complete reverse of us. If you saw somebody who is obese or overweight, they spoke English.

Robb Wolf: Right.

John Kiefer: But it was British English and American English, they spoke English.

Robb Wolf: Right.

John Kiefer: Just that buzz you get from that feeling of people who feel good and are still productive and life and still you know, know they've got a long life ahead of them to think about even though they're in their 40s or 50s, it's just such a different paradigm and it's something that I would like to see in this country again.

Robb Wolf: Yeah. It's always fascinating troubling abroad and seeing usually people think I'm Canadian if I'm not talking like Canadian or Australian or something like that because I'm not fat and so it's yeah kind of --

John Kiefer: Right.

Robb Wolf: - kind of interesting. Well you know, and clearly like a big chunk of my focus has been on this the healthcare scene. I guess my gig has always been all along and it really seems like you've thrown this out there in the same way that you know just trying to get this idea out there that there

might be a different way to do things. Like if you want to drive the car you know, at 100 miles an hour into the brick wall cool. I would prefer not to pay for that. I would like to be in a different insurance trench than race people but in my kind of libertarian leanings I'm kind of cool with that. But it's going to be an interesting couple of 5 to 10 years to see how like in the States how the affordable care act rolls out, how the economy goes, can we continue to pay for the third party system the way it is, can we continue to subsidize a broken food system the way that we've been doing.

John Kiefer: Yeah.

Robb Wolf: Like you know, a lot of the – I know people get pissed at me when I bring in some of the politics stuff. People are really excited when we beat up on Monsanto or something but when you start using these same kind of market analysis type things talking about healthcare and things like that they kind of get pissed off about it. But a lot of our problems are we subsidize the production of cheap bad food and whether you go into – you know, we simply overeat calories or we simply overeat carbohydrate at the end of the day the reason why we overeat is because we have hyperpalatable food of some variety you know.

John Kiefer: Yeah.

Robb Wolf: And the bulk of it is government subsidized and then we're paying for that on the front end and then we pay for it in the back end when people are sick and unproductive and miss time at work and all the rest of that. But it's intriguing to me like I'm not sure how or if that system can really keep wimping along. Like at some point it seems like there's going to be some sort of reckoning with that so I'm very intrigued to see how all that plays out.

John Kiefer: Yeah. It's funny you bring up the politics of it because everybody always focuses on the resulting problem that came out of the politics of it. You know, people if you were to actually describe what Nixon did with our food supply as a communist push for the food supply system, everybody would be up in arms like oh my gosh that's horrible. But the way it's pitched is it's subsidized so that Americans can have cheap affordable food. So the end result of that is like high fructose corn syrup being used heavily in our industry. The question is is it the high fructose corn syrup that's a problem or was it the subsidies that made corn a really appealing substrate to then metabolize into a substitute for sugarcane. Because it's really what is, it's hard to make sucrose out of just a pure glucose syrup but it's really easy to make high fructose corn syrup.

If you look at the trend ever since the corn supply in particular was subsidized, it's the amount of carbohydrate in the diet that's really skyrocketed whether it's through high fructose corn syrup or what have you and that's because the price of carbohydrates have deflated significantly over the last 30, 40 years. So it's really the cheapest food that you can possibly get for your family and with a larger divide between the haves and have nots, the cheaper food is obviously going to be more appealing if you've got two or three kids at home. You know, even fast food, fast food is subsidized by the corn. Just like you said, the cattle are all farm raised and they're all being fed off a corn so if you deflate the price of corn you've deflated the price of beef for the next 30 years as well.

[0:55:14]

You know, just all kind of compounds on each other and it's you trace it back and think well you know, one small change really had this huge ripple effect and nobody is looking at that small change anymore. And like you said is it sustainable and I don't think it is. I think if we went back to a competitive market, that we would see an increase in food prices but in the more refined stuff that is now hyperpalatable, cheap, easy to prepare, those things are what will get inflated in price so we wouldn't see it amongst the natural foods.

Robb Wolf: Yeah and again it's just kind of funny because people whether you know, this may be the last podcast I end up doing because everybody will get pissed off. It's kind of the political land but you know, whether you're on the right leaning side of things. I noticed that there are certain kind maybe religious right kind of leaning things that I would stick in the kind of social engineering category. I would definitely stick the same thing in the liberal left category but they've become these political talking points that are just near and dear and people want to talk about them and everything. Usually what it ends up boiling down to is trying to socially engineer behavior in people and we're either going to --

John Kiefer: Right.

Robb Wolf: --guilt them or tax them or whatever the case maybe. But then if we inject this moral hazard kind of situation in which so in a hidden way, in a hidden cost we make food cheap not cheap we're sticking a bunch of tax money into it.

John Kiefer: Right.

Robb Wolf: You know, so it's really not cheap but it looks like it's not. But that's really the problem. Like we're not going to socially engineer that problem out like these foods are delicious and the only way that you change that is you let the market dictate how much of that really legitimately should be produced and if people want to spend more money on that then they're going to have to --

John Kiefer: Right.

Robb Wolf: But then the interesting thing is possibly the solution instead of really looking at the healthcare side of this is maybe at the food production side. But it just god it rubs people the wrong way to suggest that stuff. Again this may in fact be the last – episode 204 maybe the last podcast because it will really be like fuck you guys, you're assholes, I'm done so whatever. But I would just clearly Kiefer, you've done some similar reading on this stuff and some similar type of analysis. I would just encourage people to do a little bit of reading about the history of our food production. Like when Nixon changed our intensified food production and started the subsidy system and stuff like that, interestingly it was right on the heels of also liquiditating the gold window but that's a whole other podcast.

John Kiefer: Yeah.

Robb Wolf: That's an entirely different podcast. We won't get into that. But I would just encourage people like whatever your views on this like if you think I'm full of shit, think we're both of full of shit on this stuff, just take a look at it and see. Like I would love to be proven wrong on this and find some other solution in it but I just haven't yet, I haven't found too many convincing side arguments. So dude, before we wrap up, what else do you have cooking? Where can folks find you? What else do you have cooking? What's going to be on the horizon here?

John Kiefer: That's funny. Actually I've been lying really low lately . I don't think I've put anything out. I've been on a couple of podcasts but that's been about it for gosh I think the last six months say. You know, as a lot of people know DangerouslyHardcore.com got wrangled from me in somewhat of a CD backstory there. You know, after that kind of got taken, I just wasn't sure what the next incarnation was. You know, I think I've got that pinned down. The new website is officially not announced yet but it will be up soon. CBL2, I'm actually traveling to Boston for a couple of weeks for total isolation and CBL2 will be done at the end of that which is such a major revision. I mean it's basically going to be a handbook for human metabolism starting at the mitochondria up.

Robb Wolf: Nice.

John Kiefer: Yeah. Because one of the failings I really think of Carb Backloading was and carbonate even in some respects was you know, is unleashing some very technical information on people that didn't have the appropriate background. So people just really couldn't understand some of the points and it's caused this crazy set of critiques out there that have gotten people confused and really all I want to do is eliminate that confusion and say okay these are the foundations upon which the body works and these are the key points that I try to utilize when creating these and these have been the results. So I'm really excited about that. I just think it's going to be a great product.

[1:00:18]

Robb Wolf: So you're saying that if you understand how things work then you can make some informed decisions about how to implement it? Is that really what you're saying?

John Kiefer: I know. That's the craziest concept you know, ever to be elucidated but yes that's what I'm saying.

Robb Wolf: Dude, you can learn all you need in a two day strength and conditioning deal and about a 35-minute certification that talks about this element.

John Kiefer: Right.

Robb Wolf: That's all you need.

John Kiefer: Right.

Robb Wolf: You need nothing else. It's crazy talk.

John Kiefer: Yeah, yeah well --

Robb Wolf: Dude, it was great having you back on the show. When you were first on the show, was and still is one of the most popular shows that we've had I and I threatened that we would get back on here and I'm stooped that you actually pinged me after the Dr. Perlmutter podcast which also was a very, very popular show. Clearly, it's fascinating to me. You know, there's more story here about this carbohydrate you know, the role of carbohydrate in human disease, human wellness, human performance. There's more to this story than I think what is easily spat out. You know, you can't throw too many 100% hard, hard fast rules out there. Like even

Kiefer is trying to make me rethink my thought that gluten is Satan's excrement and you know, you should avoid it like depleted uranium so I'm going to have to give some thought about that. But you know, I think it's one of these things.

Clearly, we're seeing this intersection where we see some therapeutic interventions, we see some potentiality for optimizing human performance. I think it's just worthwhile for folks to be chill and to read some research and you know, possibly most important listen to what people are saying but then get in and experiment. Run some blood work and track your own performance metrics and that's going to be the most salient point out of this. Because you know, again I've been using this LD50 example from toxicology, something that's a toxic dose for the first 50 animals there's still 50 of the animals that are alive. Why are they alive --

John Kiefer: Yeah.

Robb Wolf: -- and the other ones are dead and who are you –you know, when we're talking about that whether we're talking about carbohydrate intake or alcohol intake or your tolerance for syphilis infected hookers or whatever it is, you know, are you the one that's going to be the strong hearty survivor or are you going to be like me and be the canary in the coal mine and the first one to die? That's a really big question and nobody is really going to know that except you and your ability to individually tinker and experiment and again like you were talking about with your carb backloading too if people understand some basic mechanisms, you've got some basic framework to make like a logic chart. You know, it's like well if I do this and this happens and it will call that good or bad, you know.

John Kiefer: Right.

Robb Wolf: And then we'll kind of move forward from there. Generally, if you look, feel and perform better if some biomarkers in health and disease go in a generally favorable direction then that's good. But then you know, you bring up a great point with Rocky that I'm hanging a lot on that LDLP particle as being a significant problem but yet we have Rocky we have a reversal of a carotid artery scan which is really the indication like do we have afrogenic activity in the yard yes or no.

John Kiefer: Right.

Robb Wolf: He did before his LDLP went up and now we don't later.

John Kiefer: Right.

Robb Wolf: So what does that mean and that's a whole – and again does that apply to everybody? I don't know but that's where--

John Kiefer: Right yeah.

Robb Wolf: - I think being – you know, it's funny five years ago I would have been much more confident in knowing what a bunch of these answers are and now I'm way, way less confident so.

John Kiefer: Well you know, if you think about it we've had up until really recently the last ten or fifteen years we've had two paradigms. We've had a high carbohydrate or we've had high fat and only recently have any type of health practitioners started to kind of take this idea of ketogenic cycling seriously. And now you have just opened up a floodgate of questions. I mean we don't have anything to base any of that stuff of of and you know, I think that's why people still like their hard lines like keto adapted or carb adapted because for those we do have some clear cut information about endurance but when you look at like I said power sports, strength sports or even interestingly diseased cases like glycogen storage disease.

[1:05:00]

Robb Wolf: Uh-hum.

John Kiefer: We can very quickly see that carbohydrates are absolutely necessary for some things. If you've got somebody who's really only concerned with endurance and their endurance is up and they say well I think my anaerobic capacity is up as well well are you talking to somebody who weighs 200 pounds and benches 200 pounds.

Robb Wolf: Right.

John Kiefer: Probably not and could I have ever hit those levels with carbohydrates, I seriously doubt it. You know, I tried one on Carb Night and I failed miserably and that's what led to Carb Backloading and I did it. So there's a lot of things there that you cannot you just absolutely cannot be in a single mindset. It's like this is it. You know, there was somebody on another podcast and their question was you know, I'm a strong man competitor and I'm really trying to be keto adapted so I'm not eating carbs anymore. It's like why and it was basically they have been reading about Dr. Attia and the advantages of being keto adapted and I'm like that's not appropriate context for you.

Robb Wolf: Right.

John Kiefer: You've got to think about the context. So and you know, it just kills me there's so much research out there it's like okay a couple of fundamental things you can answer clearly and then there's tons of gray area I admit between but for maximum strength performance or hypertrophy or power production, you need carbohydrates. You at least need glycogen stores to be at a level that they can be tapped into. For you know, interesting study and I'm running over in time is that okay?

Robb Wolf: Oh totally dude, totally.

John Kiefer: Yeah. You know, some of the pivotal, one pivotal study I think is by Finney where he took some obese people and this research is studied by Dr. Attia as well, it's really interesting because he took some obese people, he put them on a high ketogenic diet but beforehand, he depleted their muscle glycogen stores to 50% of normal. And then for I think it was a six-week intervention, very, very low carbohydrate they lost like 20 pounds and then he checked their muscle glycogen levels and it had actually risen to 68% of what it had been from depletion. So even without any carbohydrates in the diet, the body sees glycogen stores as compelling enough to replenish within my guess is in that scenario it came from the glycerol flux that came out --

Robb Wolf: Right.

John Kiefer: Three chain carbon elements are great for resynthesizing muscle glycogen. So the body was you know, willing to use that recompensate glycogen stores but then the problem is and the interpretation of research is they did the same exercise which was just hiking. So we're not talking about really glycolytic exercise, they're just hiking and at the end of the hike, their glycogen level stores were still 68%. So people are like oh so you don't need carbohydrates at all for exercise. It's like totally the wrong paradigm.

Robb Wolf: Right.

John Kiefer: If you put those guys on a bodybuilding circuit you know, even if it was an appropriate one that wasn't too much volume, I guarantee that their muscle glycogen stores would not have stayed at 68%.

Robb Wolf: Right.

John Kiefer: But you know, people read those studies and they're fabulous studies. It's a wealth of information that helps corroborate all kinds of other things but at the same time it's just the wrong context for someone like a strong man competitor.

Robb Wolf: Right. Well and maybe you know, one other thought with that is that for every study we do and this is the Robert Pirsig Zen and the Art of Motorcycle Maintenance gig every study you do it just raises more questions.

John Kiefer: Yeah.

Robb Wolf: Like it really doesn't you know, occasionally you might kind of paint in a corner and you're like okay we have a pretty good understanding of this but even within that story you know, for ages we thought that lactate was only recycled in the liver via the Corey cycle. It really wasn't utilized as a substrate and then lo and behold I don't know maybe eight years ago, nine years ago it's like oh wait stop the presses, lactate is actually consumed directly in the mitochondria.

John Kiefer: Right.

Robb Wolf: And you know, I mean we had 50, 60 years of biochemistry and physiology textbooks that said exactly the opposite. You know, on an intuitive level it just kind of made sense. It's like are you 100% sure that this stuff isn't utilized as a fuel substrate somewhere, some rate, somehow.

John Kiefer: Right.

Robb Wolf: You know, and so even things like that that you know, I mean I still have some bioechem textbooks that say emphatically that you know what lactate is only realized via the Corey cycle. You know, glycogen resynthesis and whatnot and it's not used as a primary substrate. We were just wrong. We were just flat wrong on it.

John Kiefer: Yeah.

Robb Wolf: So yeah.

John Kiefer: See that's where you have to be very careful about using those universals because I read Dr. Richard Fineman who not the physicist. He does a lot of work in biological thermodynamics.

[1:10:08]

Robb Wolf: Right.

John Kiefer: You know, he just wrote this great paper on fructose in perspective and he makes the statement nowhere in the body do we actually have fructoneogenesis and it turns out he's wrong. In the lens of the eye, we actually have enzymes that allow us to make fructose and that contributes to cataracts in diabetics. And then when we talk about the anaerobic resource we're like okay you know, glucose primary we don't have a lot of substrates that we ingest but it turns out that in hair follicles they have an enzymatic pathway that hasn't been explored anywhere else that are glutaminolytic.

Robb Wolf: Hmm.

John Kiefer: You can actually burn glutamine in the absence of oxygen and produce ATP. So you know, there's all these little things and we just get little glimpses of them somewhere and it's like okay well now we've got to go through and reanalyze all the tissues of the body to see where else could this possibly be happening. So those universals are just they'll get you every time.

Robb Wolf: Right, right. Well and in Dr. Perlmutter's book too he also mentioned that astrocytes have a limited capacity for ketogenesis and you know, what's the implication with that.

John Kiefer: Uh-hum.

Robb Wolf: Yeah, yeah. But we could get pretty geeky on that stuff.

John Kiefer: Yeah.

Robb Wolf: All day long.

John Kiefer: Right.

Robb Wolf: Between the politics and us going full ridiculousness on that but cool dude. Well I am super stoked you reached out to me. I've been meaning to get you back on the show and this was the perfect time to do it. So we'll has out another three or six-month period here and crank you back on particularly after Carb Backloading part 2 is out and folks want to hear about that.

John Kiefer: Yeah. That would be great and like any opportunity to talk to you whether recorded or not, I will jump on.

Robb Wolf: Awesome, man. Well Kiefer, it's great having you on again. Take care and will talk to you soon.

John Kiefer: Yup. Ditto.

Robb Wolf: Okay.

John Kiefer: Thanks everyone.

Robb Wolf: Bye-bye.

John Kiefer: Bye.

[1:12:11] **End of Audio**