

Paleo Solution - 296

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Robb Wolf:

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Our second podcast sponsor is Hylete. I think most of you know that I'm a big fan of Hylete. I was an early adapter of their phenomenal athletic gear. They've been a huge fans and supportive of all things daily or all things Robb Wolf, so very grateful for those folks. They've come up with a really cool new program. If you go to Hylete.com/RobbWolf, then you will create an account where you'll receive a \$25 gift code that you can use on your first purchase. You will always receive free shipping and RobbWolf.com listeners get exclusive pricing. So if you want to check them out, if you've already checked them out, but you want to get additional discount, additional fantastic pricing, or if you are new to Hylete, go to Hylete.com/RobbWolf and get signed up and give them a look see.

Robb Wolf:

Hi folks, Robb Wolf here, another edition of the PaleoSolution podcast, very excited for today's guest. Chris Kelly has been on the show before. He is the founder of Nourish Balance Thrive. He is a computer scientist who has grown into one of the world's most respected and sought after performance in Nutrition coaches. We also have Dr. Tommy Wood. Dr. Wood is a medical physician who is also completing his PhD in Neonatal Brain Metabolism. Guys, what's going on?

Chris Kelly: Thank you for having me.

Tommy Wood: Yeah, absolutely. It's a pleasure to be here.

Robb Wolf: Stoked to have you guys on the show. So I did super skinny intro for you guys because I never write down advanced detailed biographies for folks. Dr. Wood, since this is your first time on the show, can you give folks a little bit more of your background.

Tommy Wood: Yeah sure. I normally give a short version, but I might give a slightly longer version Robb because you appear in it a few times in terms of how I got to where I am today. So basically, I spent most of my childhood very sedentary, lots of cookies in front of the TV and then sort of towards my late teens, I started to do a bit more sort of training and looking at nutrition and stuff like that just before I went to university and sort of I'm completely the other way. I guess a lot of people in this field would have like a health story and touched where I've been healthy, but I've sort of battled with the kind of cognitive aspects of body image and things like that over the years.

So because of that and when I went to university, I took up Robb I think I was doing a degree in Biochemistry and started to look a bit more and sort of less about body image and more about sort of performance and started doing some coaching. That was the first time I heard about Paleo and all that stuff and largely through your initial work with crossfit and you are already rising. So your early work was sort of right there at the beginning of me sort of trying to transition into this sort of field and then I went to med school and things get caught up and you sort of lose a bit of the stuff. But towards the end of med school, I started working on a family project, which was basically trying to reverse engineer, we could call it, multiple sclerosis.

So my stepbrother has multiple sclerosis and my stepfather is a chemical engineer. So we basically sifted through probably thousands of references and physician journals and all the stuff and did some root cause analysis and built some models for multiple sclerosis. And actually got to the point where we could recreate **[0:04:53] [indiscernible]** of a patient with some early parameters. So we could basically identify what the initial root cause was and look at intervention points.

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What's relevance to this is basically at that point what kind of shook out of all the research and sort of the model we built was something that diet was very important and something very similar to a Paleo diet, or the autoimmune Paleo diet eventually. Obviously, there's lots of other things

that factor in but that's a key part of the program that we started recommending to some of the patients that we worked with.

So when that happened and sort of the Paleo diet cropped back up, then I re-read your book. I started listening to your podcast. I think I was the first UK based medical doctor on the Paleo Physician Network.

Robb Wolf: Nice, right on.

Tommy Wood: At that time, it was very early on. Basically, I think my profile said something like I'm just learning about all this stuff if anybody -- but, I wanted to share what I learned. So I wasn't like charging for consultation or whatever, but people would sort of email me and we'd have some conversations and all that kind of stuff, which is really good.

Now, I moved to Norway for PhD a couple of years ago, which led me sort of do more work on the side on this sort of lifestyle and all the health and fitness type stuff. I started a blog and a podcast then I sure heard, this is where you come into it again.

I heard Chris on your podcast last time he was on. I actually signed up for free consultation with him when he was offering because he was a British guy in the States doing this kind of Functional Medicine stuff that I thought was really interesting. I planned to move to the states in the future so I sort of called him up and bent his ear asked him for some advice about his training and where he learned, what he learned. Since then, we've been working together more and more and he's had me on this podcast quite a few times despite some pretty hilarious bloopers at times and now we sort of do a lot more work together. So you've kind of popped up various points in this sort of journey that got me where I am today.

Robb Wolf: Fantastic, wow. That was very thorough and you wove in the connection between you guys. It sounds like we could probably spend two or three podcast just talking about -- it's so fascinating to me when people... So clearly, you've got a medical background, but then working with your father, Chemical Engineering background and getting in and just really root causing this stuff, like multiple sclerosis, it's so fascinating to me.

It's always really dangerous to get selection bias and whatnot. We seek out those who agree with our position, but I've got to say it's been fascinating. There have been a lot of engineers and physicists who have been getting into this Paleo ketogenic diet world and when they start looking at health, disease, wellness and I'm probably going to regret

saying this, but I don't see a lot of engineers and physicists siding on this high-carb low-fat vegan type approach. Like it ends up being more moderate or low carb, at least punctuated ketosis for a variety of hormetic stress responses and whatnot.

I always think back to Richard Feynman, one of the world's greatest physicist and the guy was dropped into the space shuttle Challenger explosion investigation. The guy didn't know anything certainly about the space shuttle, but he had a curious, inquisitive razor sharp mind and he ended up figuring out the O-Ring issues related to cold exposure and stuff like that. So it may still be selection bias, but it's incredibly validating at least for me that we have these folks coming from these very disparate fields coming in and kind of lending some way to this evolutionary medicine model.

Tommy Wood:

Yeah, absolutely. So my girlfriend is also a chemical engineer and she tells me that chemical engineers are basically trained to fix any problem. So I think anybody who is trained in that kind of field doesn't have the kind of the biases that's educated into many sort of basic life sciences and people in the medical fields. They're very good at creating a whole system and looking at where things break down because that's what they have to do. That's what they're traditionally trained to do usually in a, say an industrial process, but on a larger scale or some of the scale, the body isn't necessarily that different. So I think that kind of approach is so, so powerful in terms of getting rid of the single sort of cause/effect linear disease model that I think many people are still sort of struggling to hold on to.

Robb Wolf:

Right. Well it's incredibly powerful and very exciting having been slugging at this stuff for about 17 years. Now, it's nice to have a lot more people in the movement versus just being this complete lunatic talking about this stuff. Chris, give folks some of your background. You've been on the show before, but remind folks about your background. You have an interesting, again not a health oriented beginning to this story, but a Computer Science background clearly prepares one for a lot of critical thinking and the fundamentals of Physics and Mathematics and whatnot. I'd be interested to know how that maybe parlayed into your dissection and arrival of what you're doing in your day to day work now.

(0:10:35)

Chris Kelly:

Yes, sure. Yeah, I got into this out of necessity really. Just a lot of history of health complaints, a lot of brain fog, a lot of fatigue, a lot of bloating, a lot of not recovering very fast on the bike. Functional Medicine is something that helped me make the upgrade from a cat 1 mountain biker to a pro-mountain biker and the experience just wowed me so much that

I really just have to know how it worked. So it is my own curiosity that kind of drove me towards some of these Functional Medicine training courses that are available online now. Some of them are getting really, really good and there's so much great information out there on podcasts like this one. It's possible to become an expert in not that much time.

When I went through this, I was just so amazed by the results. You start thinking about your friends, other guys on your team, you know "oh I've seen him he's got that same sort of problem" and you start to wonder whether they could be helped by the same kind of functional medicine thing. Of course they are and then it kind of spread out from there and eventually I end up quitting my job at Quantitative Hedge Fund in Walnut Creek in California to start Nourish Balance Thrive with my wife who is a food scientist.

Judy is kind of interesting. She did a masters degree in Food Science, but kind of shuns the traditional route of becoming a registered dietician, because she wasn't not sure about some of the things that she would have to practice. She's been just super-duper helpful to me and to all the other people that we work with and it's only been about 18 months since I quit my job and started doing this full time. I just counseled just before we started this interview. We've now run labs on 498 people so it's grown really quickly. There's obviously is a demand for this stuff.

Robb Wolf: It's fantastic. So I've been meaning to have you back on the show. Anyway, Chris, I listen to your Gut Guardian's podcast and in listening to that, I had a ton of questions. You've done a bunch of gut restoration, but you're also ketotic right now I believe.

Chris Kelly: Yeah that's right. So that's I've been working really, really well for me for the last two years. I really don't want to leave that.

Robb Wolf: Could we talk about that a little bit guys? Like I've been all over the map on this stuff. My first foray into kind of more of an ancestral health diet was essentially ketogenic diet, occasionally cyclic ketogenic diet. Cognitively, I feel great on that. I've always found it little bit difficult to crack the nut of optimum performance. I do Brazilian jujitsu and I'm kind of wondering if that kind of glycolytic-based activity is a little bit difficult to match with the ketogenic diet.

But then also -- and I'll put Grace actually in this camp, like there are some folks that are just kind of like, hey, you're going kill your gut. You're going to kill your gut microbiome if you're low carb or ketotic. Basically, your penis is going to fall off. What do you guys think about that? I know

that that's like probably 18 questions. Like what do you think about ketosis in general for different athletic pursuits? I feel cognitively fantastic taking ketosis, struggle a little bit on the performance side, but then, where is this leading into the gut biome and gut health and I know Chris, you've been doing some things like bionic fiber and what not in addition to your basic ketogenic approach, but what do you guys think about all that?

Chris Kelly: Yes. So I think Dr. Grace has been one of the people including Tommy that's been incredibly generous with their time helping teaching me. She sends me a lot of scientific studies. We've done webinars together and she is amazing.

Robb Wolf: A genius.

Chris Kelly: She is genius.

Robb Wolf: She's a genius. When you get on the download side of when she starts telling you about something, there's like 50 references and she knows all the details to all of them and I'm just like what are you. Are you like a Vulcan or something? What is going on here? Sorry, yeah, yeah.

Chris Kelly: It's so funny. We did these webinar together and then I get them transcribed and the guy that does my transcriptions, I think he might be your same guy because it was Squatchy that gave me the referral, like a couple of years ago even. He came back to me and he said, we're having tremendous trouble trying to transcribe Grace. Is there any other resources you can give us to try and help translate some of these words.

Robb Wolf: Grace to English, yeah.

[Laughter]

(0:15:05)

Chris Kelly: But yeah, I mean, so my takeaway so I've done lots of work with Grace and Ubiome test I'm sure a lot of people listening to this would have heard of and maybe even done it. I've produced a tool that turns your Ubiome data into a phylogenetic tree. So it allows you to see the species level of data in your results.

We've been looking at those and talking about them a lot and when I look at Grace's recommendations, there is not a lot of starch in there. So she talks a lot about non-starchy root vegetables, things like sunchokes, chicory, dandelions, onions, leek, garlic, scallions, shallots. So these are

the things that I eat now. I did experiment when we counted the number of different plants that we have in our diet on a weekly basis, but when we got to 46, which I think is pretty pathetic compared to what maybe ancestral populations might have eaten. But it's an awful lot more than I think most people eat. So I don't think I'm doing my gut microbiome at a service by eating this ketogenic diet just because I'm still eating so many plants.

Robb Wolf:

Interesting, okay, okay and the non-starchy roots, typically, they're rich in fod maps. Like sun chokes are rich in fod maps and we run into some problems with some small intestinal bacterial overgrowth in that story. Like I've been really curious what my problem is. I'll just make this largely about me and hopefully lots of people can benefit from that.

The problem that I've had with higher carbohydrate intakes is that the benefit is that I tend to have some pretty good athletic performance if I get all the timing correct with that. The challenge that I have is that I can get hungry. I get the brain fade, brain fatigue. I had a vaginal birth. I wasn't breastfed. I was on antibiotics from the age of 13 to about 21 for acne, which was caused from dairy. Once I figured out the cow dairy specifically gave me acne, then that was a huge like it went off for me, but I was on antibiotics for ages. Had Giardia treatment for that.

So I'm just kind of wondering if both on the genetic and epigenetic level if the carbs are just stacked against me in such a way that doing 2 or 3 inter grams of carbs a day is just not really going to be in my future if I'm going to avoid type 2 diabetes. Like I really had symptoms of vision impairment, I would check my blood glucose and I had some very long lasting elevated blood glucose levels from pretty moderate starch-based meals. Like 50 grams of potato or sweet potato effective carbohydrates would keep my blood sugar up a long time. What do you guys think about all that?

Chris Kelly:

I should let Tommy speak about that.

Tommy Wood:

I think this is really interesting. The effect on if you're talking about the effect on the gut microbiome, I think in terms of trying to optimize both performance and health, you should like try and address... Let's say if you have small bacterial overgrowth, if you have some kind of unwanted growth or infection, I think you need to start by addressing that before you start playing with anything else. I think you need to start by focusing on -- I think everybody should start by focusing on health and then kind of move on and maybe the next step is something like a ketogenic diet if you perform well on that. Chris obviously performs very well on that and his sports lends him to that. It's generally longer endurance based -- He's

a mountain biker. I know that he says that if you're sprinting on a mountain bike race, you pace yourself properly. So you don't necessarily need that top end in terms of performance like you need maybe if you're doing some grappling or something like you do Robb.

Robb Wolf: Right, right.

Tommy Wood: In terms of the question of ketogenic diet obviously I spent most of my days trying to treat brain injury. I think particularly within the central nervous system ketogenic diets are immensely powerful in a therapeutic sense. But I don't think we have the evidence any --so if we go back to an ancestral model I don't think any population was consistently in ketosis.

Robb Wolf: Right.

Tommy Wood: Based on their diet. So I don't think it's something that we should be maintaining long term, but it's something that we should absolutely be able to dip and out of. So then when you're coming to somebody like you, I think carbs cycling is something that I'm a big fan of. I think when we try to reproduce or reinstate insulin sensitivity and maybe there was a point in time when your diet and lifestyle and history matched up to sort of produce some level of insulin resistance is what it sounds like. I think actually creating some dynamic movement within your insulin release by actually maybe having some carbohydrate can actually promote insulin sensitivity. So actually we know the body is a dynamic system actually if you have dynamic changes and things that that improves the ability of the body to respond to them rather than having everything very high or everything very low at the same time.

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Robb Wolf: One of my favorite academic paper is sort of review paper but it's called Secrets of Lack Operon and really what it boils down to is arguing that a big part of aging and cell senescence is a loss of the ability to utilize either fat or carbohydrate as a primary fuel source. They didn't implicitly say this but really what I took from it is that it's probably a good idea to cycle the macronutrient in some ways so that you're forcing some acute adaptation. So like a carbohydrate restricted period and then the hormetic stress of actually getting a carbohydrate exposure ends up mitigating some other like advance glycation end products and whatnot.

So I've been a big fan of carb cycling approaches. Chris have you played with carbs cycling much within your performance activities or even within the clients that you're working with? Like within this spectrum of clients so how many people end up landing squarely in kind of a ketogenic

protocol versus kind of a day to day mixed macronutrient story versus say like a carbohydrate cycling protocol?

Chris Kelly: It's funny. It seems like all of the men are just following exactly the same path now and it almost got to the point where I want to say to them in the beginning okay, so this is the path we're going to take.

Robb Wolf: This is what we're going to do. It doesn't even matter what the days are yeah.

Chris Kelly: And I don't say to anyone. We don't make -- I say we because I'm referring to my wife because she usually does the food coaching. We definitely don't make ketosis a goal at any stage in the program, but the usual process is people do the test and maybe they find some small bacterial overgrowth, small intestinal bacterial overgrowth or they find Giardia or some of the parasite or a bunch of nutritional deficiencies and then they fix those. Then I do a followup with the person say one or two months later and suddenly, they're tracking their ketones with blood or with the ketonic breath meter and they've never felt better in all their life.

Now this is amazing like I can't believe how good I feel and then I felt pretty good when I got rid of the blastocystis hominis infection but now in ketosis, I feel absolutely incredible. This seems quite specific to the men and you have to remember that most of these men are cyclist as well. So they're not going to run into the same problems that you might with the grappling and then they're not really doing that much glycolytic activity.

I spend so much time talking to Tommy and I've very sympathetic to his ideas and he sends me, I don't know. Even send me like a thousands words a day of email and then usually there's six papers attached to each email. You'll ask him a question in five words and the response is a thousand words and six papers attached which is fantastic for me. I spent all this time reading these papers and yeah, I've gotten more into once a week, I'm doing cycle cross at the moment and that's a 60-minute event and so there's definitely a sprint of the star and actually there's quite a lot of sprinting throughout because there's so many corners. Like every time you exit a corner, you've got to sprint really. I've been doing some carb reloading just a day or two before the race and have noticed really no difference whatsoever if I wanted. I just feel slightly more hungry and like mentally, I don't have the same clarity and that's the only two things I really noticed.

Robb Wolf: And that sounds exactly like me.

Chris Kelly: Yeah, and super hungry.

Tommy Wood: So I think there's definitely ways to mitigate that response. You can do your protein and fat before the carbs go in and you could add vinegar or some kind of acid and that reduces the insulin response and things like that. So people can play with that.

Also I often find that you get more hungry if you eat your carbs at night and then you also get greater insulin response to whatever you eat the next morning. So folks who are eating their carbs at night might actually get a double whammy and then they wake up starving in the middle of the night because their blood sugar has dropped and then they get another insulin release in the morning.

So I think there is some --you know, Paul Jaminet talks about timing carbohydrate loads to the -- and there is a lot of evidence that when you're retraining circadian rhythms that actually the biggest meal and maybe the largest carb load should come just after the nighttime fast. So then you can actually be eating in the morning but then people starts to see the cognitive effects so it's kind of when you actually time those becomes very personal thing I think.

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Robb Wolf: Right, right and maybe you're weaving a little bit of ancestral perspective. I suspect that a lot of my problem is just sedentism and so a lot of my work is cognitive. I'm standing at a work station right now which is I guess better than sitting, but it's still not moving around. I find that if I'm out doing something all day like if I just take a day and I play hooky and take my daughter hiking and we're out for like 6 hours and she is in a backpack on my back, I'm much more resilient with regards to what my macronutrient makeup is.

In preparation for winter here, we had a bunch of wood delivered and a lot of it wasn't really cut to the size that we needed and I spent probably 4 hours one day splitting wood. It's not a frenetic pace but it's reasonably intense. Some of the pieces were really big so I had to use like an awl and sledge hammer and all this stuff. It was definitely demanding, but I just I noticed that day that just in general I just felt a lot better.

The whole deal of noninsulin mediated glucose transport and disposal like I have a feeling that because of our sedentary lifestyle, we're used to a bunch of our metabolic regulation happened as a consequence of activity. Now it's just falling on our pancreas. Like the pancreas has to

shoulder the whole load with that. Does that sound plausible or ridiculous or what do you guys think about that?

Tommy Wood: I think that makes perfect sense. I actually gave a talk Health Unplugged in London last weekend and you did a video link for it last year.

Robb Wolf: Oh yeah ,yeah.

Tommy Wood: So I gave a talk about insulin resistance so I've been trying to build a model for that in a similar way to what we did in multiple sclerosis. I think what people don't really understand is that insulin like -- we're traditionally taught that insulin is there to just make blood glucose go down. Like blood glucose goes up, insulin comes out shoves glucose into cells and then blood glucose falls.

But actually in terms of like all the things that insulin does glucose disposal should be pretty much on the bottom because your skeletal muscles should be sucking up glucose independent of insulin the rest of the time. Actually it takes a lot of insulin to make glucose go into muscle or fat, but it takes a lot less insulin to change glucagon release or make or initiate lipogenesis. So it takes a lot less insulin to stimulate the production of body fat or the laying down of body fat than it does to actually push glucose into cells.

So actually, you're right that we're sort of potentially forcing our pancreas to work harder than it would traditionally do because actually blood glucose wouldn't actually be regulated by our activity because the muscles would just suck it up independent of insulin. We sort of circumvented that. That makes better sense?

Robb Wolf: And so much of what we're trying to regulate like lipolysis and then the gluconeogenesis is kind of bugged because the colon response from food to pancreatic activity basically just bypasses all that nuanced interface like glucose disposal in the muscle and whatnot.

Tommy Wood: Yeah absolutely.

Robb Wolf: Interesting, interesting. Okay this is going to be my last podcast and then I'm just going to be full time coconut farmer after this. Fuck it we're done.

[Laughter]

It's interesting. You know, cry me a river on the one hand, we all live in modern affluence and developed countries and everything and we get to

live in warm or cold homes and have a pretty damn easy life. But it's fascinating that you have to start thinking about ways of circumventing this relative ease that we have and then also the need to just make a living and keep that roof above your head. Although it seems like maybe living under a bridge might be appealing from a health standpoint I guess in some ways.

But both of you guys are doing a pretty broad variety of testing and analysis on folks. Chris, I know you guys have been looking more recently at two opposite ends of the spectrum with regards to iron. One is an anemic condition and then the other side is an iron overload condition. Could you talk about that? How did that get on your radar and then what have you seen clinically and then what are you doing as far as recommendation standpoint?

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Chris Kelly:

Yes. So I thought in the beginning before I started any of this years ago, that iron deficiency and anemia were the same thing, like that was the same, two different words but the same thing and that's not true at all. Iron deficiency is just one of the things that can cause an anemia and I'm bit like you actually. I've never actually tested like I've never had a gastroenterologist say to me, you are celiac and that diagnosis never came.

I stopped eating gluten long before I got to that stage and when I was pretty messed up, I had very low iron levels and I was also very anemic and I actually ended up in hospital having iron infused into me. It didn't really affect my hemoglobin very much. So hemoglobin is the protein inside of red blood cells that transports oxygen and the reason I cared so much about this is because I'm a dumb ass sports guy.

[Crosstalk]

Okay. So I need to get my hemoglobin up if I'm going to win any bike races so I was like really paying attention to this thing. Eventually I figured out through the chemistry the whole blood chemistry that there's a lot more moving parts to this anemia thing and several of the nutrients are involved in the production of healthy red blood cells and then there's these things which can destroy blood cells before they're ready to die. You need to address all of those things before the hemoglobin starts to come up.

So yeah, we've been doing lots of blood chemistry. Tommy and I have been looking at tests together and then recently it was kind of crazy. It was this weird thing where we did this podcast on iron overload. So it maybe that we sort of tapped into like a little niche here of people, master cyclists in their 40s and 50s. They had been eating the Paleo diet

for a couple of years and it seems like the Paleo diet is almost working a little bit too well. They're taking on too much iron and maybe they have some genetic mutations that make them really good at absorbing iron and then, when you run a blood chemistry on them, you see that they have iron overload.

And then another kind of interesting piece to this is often, these guys, they're already eating a low carbohydrate diet. So they've checked their blood glucose, they're like wow, crap I'm headed towards diabetes so I'm going to stop eating the carbs. But then when they run a blood chemistry, they find out that they've got too much iron and that might be what's driving the insulin resistance. So there's like two sides to it. It's very complicated but yeah, it's kind of funny to see these patterns emerge.

Robb Wolf: What are those patterns? I mean you're looking at a ferritin levels, hemoglobin, what exactly are you looking at?

Christ Kelly: Yes, if you look at the transferrin saturation, the percentage and then ferritin and usually you see like everything is all messed up on the blood chemistry. Usually, there is some inflammation. What are the markers you look for Tommy?

Tommy Wood: Yeah. So you can look at various different sub fraction or sub studies of the red blood cells so how much hemoglobin is or isn't and then the size of the red blood cells. We look at various different markers of inflammation both in the blood and if somebody is doing urine analysis and the urine organic acids test.

Then I think ferritin is very underused test actually just to look at either inflammatory load acutely so then in the short time or total iron load in terms of sort of how much people might have on board. Actually very interestingly if the first time that anybody used the word insulin resistance was from a case of hemochromatosis back in the 1920s.

Robb Wolf: Interesting.

Tommy Wood: That's when the term insulin resistance came up from a guy with hemochromatosis who needed 1680 units of insulin a day to keep his blood sugar.

Robb Wolf: Holy smokes. How many pork pancreases got sacrificed for that, holy smokes, wow.

Tommy Wood: Yeah, that's a lot. So I think particularly like Chris is saying particularly in middle aged man, we're seeing more and more of this. Actually the more you dig into this so people talk about the more traditional sort of recessive hemochromatosis mutations – or I guess they can be company-dominant. So somebody who has one copy might have some iron overload but nothing that they would really treat and then somebody who has both copies of the mutated gene then just sort of can accumulate so much iron that they end up sort of in every organ and can cause multiple organ failure in the end.

But actually, there's lots of nuanced genes that seem to be cropping out and different ones and different populations around the world. So the C2Y gene is the one that people talk about the most is seen in Scandinavians and Caucasians particularly. But actually, it looks like most cultures or people from certain areas of the world have their own nuanced mutations that might be sort of driving some degree of iron overload. It was an evolution back in the days when you got holes poked in you by somebody but that doesn't really happen anymore. So I think people who donate blood live longer and have better insulin sensitivity and that might be one of the reasons.

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Robb Wolf: It's funny because I was digging around on the blood donation piece because I know that there was some concern that folks maybe depleting stem cell pools by doing that. But I just couldn't really find anything that supported that. It's interesting across the board. You tend to see better longevity and there maybe some cultural pieces to that like if you're doing something good and feeling connected and obviously some potentially systemic inflammatory issues. Guys remind folks what happens and maybe this is for folks that are out there on the practitioner side of things, how can the iron readings be skewed if someone is sick and how might that be misinterpreted like with an infectious agent?

Tommy Wood: You should talk about ferritin and what's it for. It's like a really fascinating practice.

Robb Wolf: Yeah so it's really interesting.

Tommy Wood: So basically ferritin is in that context is what we call an acute phase protein. So basically in response to inflammation essentially your acute inflammation some of the cytokines or basically the proteins that white blood cells the immune system use to talk to each other. They sort of drive the production of ferritin. The way I like to think about is basically because iron is such an essential nutrient and your body starts to hoard it almost and you see that in people with chronic inflammatory diseases

like something like rheumatoid arthritis, maybe they end with something called anemia of chronic disease which is basically that they've got plenty of iron on board but it's call squirrelled away in ferritin. It's sort of they're basically storing it for a rainy day almost.

So if somebody is sick, then what you'll see is that ferritin spikes for that reason because the cytokines cause ferritin expression to be increased. But then there are sort of other things that you can look at so maybe fibrinogen CLP, ESR on the blood and if they're increased as well as your ferritin, then maybe you say, you feel great, you have a viral infection and feeling very well at the time that the blood were taken and then maybe you need to repeat to another time. So I think it has a great utility but you always need to know the context of when the sample was taken.

Robb Wolf: Right, right. Guys, if I get out in the weeds or I get this wrong, totally correct me, but what I've seen in this regard is that folks that might have some intestinal permeability, I see some aberrant ferritin levels and also oxidative stress. Kind of how I've made sense of all that is that normally, ferritin would be elevated in the presence of an acute infection, but in the case of intestinal permeability, we can have a chronic infection which drives that whole process. Although ferritin sequesters iron, it doesn't sequester it fantastically and iron is a really nasty pro-oxidant and so we get more oxidative stress and instead of this being an acute phase process, it's chronic. I mean, is that kind of etiology or kind of a path that you guys have noticed or does that make sense?

Tommy Wood: Yeah, it does. We see this in the organic acids. So the organic acid tests that we do is made by Geneva Diagnostics. It's called the organic comprehensive profile and there's a couple of markers on there. Number 28 and 29, which is the hydroxyphenolactate and 8-hydroxy deoxyguanosine and those are markers of oxidative stress. So usually we have more than one result. So we look at the organic acids and the blood chemistry at the same time and you see that pattern of oxidative stress of inflammation across multiple tests and then it starts to tell this big story and you know something is going on.

Robb Wolf: Interesting.

Chris Kelly: And going back to Grace there, we have a bit of back and forth about iron overload and we got obviously. She found it interesting or she noticed in one of her clients I think that when she replaced missing Bifida bacterium longum in the sort of gut microbiome then actually the iron overload improved. There was actually one study in mice in a mouse celiac model where basically they showed the longum can sort of regulate iron load

and that might be through something like gut permeability and gut health which then changes the inflammatory load as well. So that sort of ties back into the gut permeability and problems there that might be driving in some of these issues.

Robb Wolf: Right, right. Man, it's so interesting. Each question I asked you guys I keep scribbling down more and more questions to follow through.

Chris Kelly: Grace always does this to me. So every time I find a problem, I ask Grace about it and she always sends me like a ton of papers that show that actually it's all to do with the gut and *missing bifidobacteria*, and I'm like oh my god. Like all I've got to do is restore the Bifida bacteria and I'll be fine.

Robb Wolf: I almost have a Pavlovian response to pinging Grace a question because I'm like oh make it stop. But it's fascinating because it might all more or less boil down to the gut. What do you guys think like I've talked with Dr. Mike Ruscio a good bit and there are some situations... I suspect I could be totally wrong, but I suspect that we may see pathology emerge because of changes in the gut biome, but I'm also wondering if there is not different vectors there. Like you can get an alteration in the gut biome just from a night of missed sleep. So like shift workers will have alterations in the gut biome immediately as a consequence of that I assume because of stress and kind of cytokine signaling.

Interestingly, you also get the media up regulation in lipoproteins. So this is where I find it really challenging to fit into the standard scientific randomized controlled trial model because if you can alter the story from both ends, it really to me doesn't seem amenable to a classic RCT to try to get to the root cause of all this. What do you guys think about that and what can we do in response to that? I mean to me it seems like do good clinical medicine, use the best models you can and then do good clinical medicine, but a lot of folks in the skeptic scene think that that's a pseudoscience. So what where you guys at with that?

[Crosstalk]

Chris Kelly: Sorry Tommy, go ahead.

Tommy Wood: Go ahead Chris that's fine.

Chris Kelly: I was just going to say I've been interviewed Michael and he's been very helpful to me as well and sent me a number of papers to look at and I just can't figure out honestly. I can't figure out whether the insulin resistance brings along the lack of akkermansia or whether it's akkermansia or the lack thereof that drives the insulin resistance. Akkermansia is a specie of

bacteria. You can measure on the biome test actually. So we see that data a lot and I really can't figure out. But I'm very sympathetic to Grace's idea that you can manipulate the gut microbiome using these bionic fibers and certain probiotics and no doubt, we definitely see people improve their health when they do that. As for the science, I don't know.

Robb Wolf: Okay. Doc, what's your thought on that?

Tommy Wood: Yes I'm a huge fan of Dr. Ruscio actually. I think his approach to the gut microbiome is by far probably the most balanced out there and probably because it's one of the most well informed. He obviously talks about the fact that we're not at a point where we can attribute causation to any changes in the gut microbiome. That's because they are so dynamic. Without doing anything you could test your Ubiome a month later and actually see why it changes and you don't really know why.

So the way that I think the problem is that the way I see is that your gut microbiome basically morphs with your own physiology and supports that physiology in whatever state that becomes. So then you can dramatically change that with antibiotics or maybe some aspects of the hygiene hypothesis being overly clean and not getting your parasites at an early age or something like that. But basically I think the two kind of morphed together so if you try and change the gut microbiome without addressing other aspects of Physiology, then you're not going to see results. If you just try and change your physiology but you also have some underlying problems with the gut microbiome, then the two won't necessarily match up and you won't see the results. So you can kind of have to morph both at the same time and I think that to me that kind of explains the science that we have although I mean it absolutely might not be right but I think that the two kind of move together rather than one necessary causing the other.

[0:45:12]

Robb Wolf: The dominant.

Tommy Wood: Yeah, yeah.

Robb Wolf: Man, it makes it really slippery and I think for the standard reductionist model versus the systems approach, this is where I have passing or very little faith in the academic process currently because it seems the models are so broken. They're so stuck. Again, it's interesting that some of our deepest insights into these topics are coming from engineers or physicists outside the scene who are getting in and really just looking at the data and they're pretty well acquainted with systems methodology. Oddly enough like science folks you would think that they would be really well

steeped in systems theory but they're really not. I mean it becomes a very austere silo that they exist in and we get some great singular data out of those folks but as far as integration I'm not seeing fantastic integration out of those camps.

Tommy Wood: No. I think in order to get a useful result in the long term, I think we need people at all those levels. You need the cell biologist, or the neuroscientist who's basically just going to research the crap out of one protein or one cell to try and generate data that somebody else can then maybe synthesize into the big picture. I don't think people who are doing big picture work couldn't do their work without the people doing that kind of research.

Robb Wolf: Right.

Tommy Wood: But if you're trained in a traditional science model or maybe even if you're trying to get results on that kind of level of detail, then you need to be that sort of single minded. It might that's kind of a requirement in order to do quality work in that field but then you rely on somebody else. You then can't be the person to give everybody the answers because you focus on just one thing.

Robb Wolf: Right.

Tommy Wood: And so then you need people who are better trained in synthesis of data and information to come and sort of piece that all together.

Robb Wolf: Right, right. I like it. I like it. Going back to the iron load really quickly, I had a note jotted down there. Chris, where were you on the iron overload spectrum? Did you need to do any type of phlebotomy, blood donation to clear that up? Then folks who do this again trying to poke around at this ketotic versus nonketotic existence like you see folks very frequently if they address the iron overload issue then they don't get hungry. They don't get the brain fade. What are your thoughts around that or what have you experimented on yourself?

Chris Kelly: Yes being on the celiac side of things, I was the opposite. I wasn't absorbing iron very well and so I ended up with them having intravenous iron therapy, but that's uncommon. So what I'm seeing now mostly so my buddy Ross might be talking about and he is my best friend and we've done some blood chemistry on him. Then he had the same thing like signs of iron overload and it can be really difficult when you're British living in America to try and give blood because they think the old British people have mad cow disease.

So you can't go the Red Cross and give them blood and so you have tremendous trouble and he just told me this morning that he has found a hematologist that looked at his blood chemistry and said, yeah, that's fine, I can write you a prescription. You can go and give blood. But yeah it's kind of crazy. I just don't understand what's going on here why it downs to me to like find this right? Shouldn't doctors be running this? But it seems like he didn't really want to do the test unless they absolutely have to.

Robb Wolf: Right. I just want to throw in there really quickly. I can't tell you how many times where it's almost kind of like there's a lineup at least in my head and I'm like am I really the most qualified person to be talking about this. This is fucking nuts. What's going on here? Sorry doc. Sorry, keep going.

Tommy Wood: I was just going to talk about an interesting case that Chris and I went together and I don't think it's going to be that uncommon which is basically a guy in his late 40s or 50s not feeling very well and these are the people that come and see Chris and I. I mean they listen to all the podcasts, they read all the blogs, they probably read a lot of science. They've tried everything so they're kind of doing as much as they can based on their own lifestyle stuff and this guy basically because he was iron overloaded all of his cholesterol markers went up particularly his LDL which is very common. Because nobody checked his ferritin or checked his iron that was the whole bit, they stuck him on a statin when actually probably a large part of the problem was the iron in the first place.

(0:50:07)

Robb Wolf: And would you maybe even digging deeper on that, maybe it was some sort of gut permeability, LPS problem. Like when you start digging around in that then you see thyroid dysregulation from LPS interaction and the cortisol response. I mean that's where it really becomes this onion that you're peeling and if you stopped at the first thing, the first thing or maybe the thing that we check the most frequently say like a cholesterol or lipoproteins, you pat yourself on the back. You're like okay, avoided a heart attack, but not really sure if you did and definitely didn't address the underlying causative issues there.

Chris Kelly: Yes. So the effect of inflammation on, you know, reduces deiodinase activity of the tissue level so you're not will not actually generating any T3 from the T4 that your thyroid is pumping out. So you're not actually getting any thyroid hormones working where they need to be. I think a lot of what's happening is that kind of what I think is happening for a lot of people is they generated this functional gut microbiome with the sort

of standard western lifestyle and then if they switch to a very high fat diet, we know that that can increase transmission of LPS across the gut. So I think it's definitely an argument said for fixing the gut before you start throwing loads of fat on it just because actually might be in the short term at least increasing your inflammatory load.

Robb Wolf: Right, right. Chris again this circles around are we mitigating that whole process by saying the ketogenic diet scenario by just using bionic fiber, using lots of sun chokes onions, leeks that sort of stuff? Like this is where my head starts spinning and I'm just like oh Calgan, take me away man. I don't what to do.

Chris Kelly: Yeah. I know what you mean. I do wonder whether some people they're coming to the low carb thing because they're trying to manage some of other problem and Tommy has just given a fantastic talk –will your talk on insulin resistance at public at some point Tommy?

Tommy Wood: Yeah. It will be. The video wasn't very good quality so I'm going to try and fix that and put it out there, yeah.

Chris Kelly: So I mean the point of the talk was it was kind of just to demonstrate this enormously complicated what causes insulin resistance. It's not just the carbs, right, and so I think lots of people are coming to us with this complaint and then managing the problem with a low carb diet, but really, there is something else going on and you've really got to sort out that something else if you're ever going to be as healthy as you would like.

Robb Wolf: My head is spinning right now. Let's see here. I've got a ton of other what do you guys feel like is the newest thing that you are seeing clinically or like the most gee whiz moment that you've had in the last say like month.

Chris Kelly: Wow, let's see.

Robb Wolf: Or is it all the same thing, it's poop. It's just poop. [Laughs]

Chris Kelly: Yeah, there's so many happens. So I can talk about some of the patterns I see in the test results. So there is this thing that people being talking about for a while now called adrenal fatigue and people used to talk about the stages of adrenal fatigue and there was high and low cortisol and all of that. As I said, I've run about meet close to 500 of these tests now and admittedly, all of the people that have done the test, they're all

very similar. They're all athletes. They're all probably a little bit over trained.

I've only ever seen high cortisol twice like of all those 500. It's just doesn't ever happen and in the person, the two people that I saw, there was like a clear explanation for why the cortisol was high at that particular time of the day, right? So it's a 4-point test, the cortisol was super high in the morning and in one case, it was someone that was having like a sort of posttraumatic stress kind of reaction to the alarm clock and then the other one was a type 1 diabetic. He would let his blood sugar drop too low and everybody else is just completely burned out, very low cortisol.

I think it's really important like if you've done this test and you've figured this out for yourself that you don't like just leave it at that. The low cortisol thing, adrenal fatigue, there's probably nothing wrong with your adrenal glands and don't stop there. You've got to keep doing the other tests and find out why the cortisol is low in the first place because there is always a reason.

So somewhere in your body inside of these adrenal glands, there is a cell that's trying to synthesize this hormone cortisol and there's a reason why it's not happening. Like either the cell doesn't have everything it needs to do to make the hormone or maybe the brain doesn't want it in the first place because there are some other sort of inflammatory process going on. So there is always something else going on. So you kind of really got to the adrenal fatigue thing is really the start of your investigation and not the end.

(0:55:03)

Robb Wolf:

What are you doing to --so I know like classically liquorish root, adaptogens, B vitamins, Vitamin C folks will typically feel better from that particularly if they modify whatever the stressor is which starts begging the question like are these supplements actually doing anything or they're just palliative and reminding the person to not do 6 crossfit workout a day and stuff like that. What are you doing to address that issue and does it really depend on what the individual has happening?

Chris Kelly:

Yes. So I think the main thing that I'm doing to address that issue is getting rid of whatever it was that was the causing the problem in the first place, right. So getting rid of an H. pylori infection, that works pretty well for getting rid of adrenal fatigue or Giardia infection or some of the intestinal bacterial overgrowth or some other gut dysfunction. That works great if you're getting grid of adrenal fatigue and I see not to be that important to get the person to do things like stop exercising. Like I

didn't do that when I found out that I had super low cortisol and I treated it and got rid of some gut infections. I've not really been pushing very hard for any of the people that I work with to stop doing endurance exercise or give up the stressful job or do any of that stuff.

For me personally, I've done nothing but add stress since I found out I had low cortisol and then retested and found out that it was fine. I've started a new business. I've had a baby. We've moved house several times and I don't have adrenal fatigue, right. It's obviously not just the stress that's causing the problem.

Robb Wolf: Interesting.

Chris Kelly: So I think most of the -- what it looks right now is the sort of adrenal fatigue has been labeled for the wrong organ in the body and probably most of it comes from hypothalamic dysregulation and probably most of that either relates to oxidative stress or inflammation. Then what people are seeing in terms of low cortisol on the saliva test, it might actually be that you're producing enough cortisol but actually you're rapidly metabolizing it for whatever reason and probably for similar reasons because of some kind of inflammatory process or high levels of oxidative stress.

I think one reason why maybe then people feel better on a ketogenic diet is because the ketogenic diet can slow -- you get a change in the enzymes that metabolize cortisol. So you can actually be boosting. You're not increasing the production of cortisol, but you're slowing the breakdown of cortisol so that actually you could be bring your cortisol back up, which does actually make you feel alert and makes you feel good especially if your cortisol has been low.

Timmy Wood: Oh yeah, no mistake about it. Like I'm not denying the existence of it like when you talk to someone that's got low cortisol, they feel like death.

Robb Wolf: Right, right. Yeah after by book tour, I was broken. I had thyroid dysregulation cortisol dysregulation and what I did do is really decrease my pace significantly while also trying to tackle some other things. I've done some Genova testing. I've done some SIBO testing like haven't really gotten anything solid back on that, but this is where I feel like I'm kind of in this rope a dope where people like Grace, Paul Jaminet, they're like you should be eating more carbs than what you're eating. I feel like shit when I do.

Then I wonder do I have some gut issues and I can't really seem to find anything on that. I'm still waiting on my Ubiome test to see what's going on on that side. So I haven't really found much on the gut side but I seem to have all the symptomology of somebody that's just not processing carbohydrate all that well. But again, if I was physically active most days at a low level just like hiking or cutting wood or whatever, all of that stuff just goes away. So again, maybe I'm an APOE33 genotype. I seem to have dug up some stuff that indicates that high level physical activity really make those folks happy in a lot of different ways. So again, maybe I just need to ditch this online gig and start like manual labor or something.

Chris Kelly: Let me ask you. What kind of tests have you done then? Because kind of the devil is in the details with some of these tests, some are better than others. Which ones have you done?

Robb Wolf: I will forward all of them on to you and then when we get you guys back on the show, then we can do some analysis on that.

Chris Kelly: Yeah that would be fun.

Robb Wolf: Yeah.

Chris Kelly: And if you want to do some more testing I'm more than happy to send you those tests.

Robb Wolf: I will have as many people climb into my hoo-ha as I can get it. The more the merrier at this point so. Yeah.

Chris Kelly: Just have to maybe slightly controversial to say that Robb, I've heard people both tell you that you need to dramatically reduce your carb intake and dramatically increase your carb intake from supposed experts in the field on both side but maybe it was just time to stop worrying about it so much. Eat what makes you feel good.

Robb Wolf: The funny thing I absolutely agree and my wife, like clubbed me over the head with a like a large fish the other day with that. But what I'm really – you know, folks will get so insular on this topic and like I came in to this definitely into Paleo, but very much on the lower carb side of things. We started learning things about like amylase gene frequency and different things like that and I was really trying to not dig my heels in and be that guy that just this is the one way to address all this stuff.

So I've tried to be very open experimenting with all those, but I've got to say like the last three years of farting around with like safe starches and

stuff like that I just have felt even shittier than I did before. It's like I have little windows where it's like ah that feels pretty good, but I almost feel like an emphysemic on an oxygen bottle. Like I'm just running from just perfectly... So we have two analogies, the emphysemic on the oxygen bottle or it's like the mating dance of two tropical birds where you've got like bob your head and wiggle your ass and flap your wings, just exactly right to get everything perfect. If you get one thing out of whack, then the whole thing like falls down whereas if I'm more ketogenic or even cyclic ketogenic, I just feel a lot more resilient. I just feel generally a ton better.

Chris Kelly: Yeah.

Robb Wolf: Interesting.

Chris Kelly: I think that probably tells you all.

Robb Wolf: About everything I need to know.

Chris Kelly: About everything you need to know really especially you don't have any health problems and your various markers look okay, then.

Robb Wolf: Right.

Tommy Wood: Stop listening to people like Chris and I and just...

Chris Kelly: This is a problem though . I've talked to Tommy more about this. He's done a thousand episodes of his podcast and so if there's an expert on the planet, he's basically talked to them.

Robb Wolf: Right.

Chris Kelly: That's been really confusing for him. It's like you want to do every last thing that you hear someone talk about and there's only so many things you can do especially if they're pulling you in different directions and I don't know how I have avoided this confusion. Perhaps I'm not listening properly.

[Laughter]

Robb Wolf: You probably just spend less time online and you're actually like coaching people and doing stuff so.

Chris Kelly: Yeah.

Robb Wolf: Part of it for me, just psychologically I'm kind of like okay I should be able to eat more carbs and so I just need to figure out whatever hoops I need to jump through to affect that change. To this date, it's still hasn't really been the case for me. So still I'm just ramping up like the bionic fiber and fiddling around with some stuff like that again, like I took my Ubiome before incorporating that in. I still haven't even heard from the Ubiome folks so I don't know if that poop sample just like disappeared into the ether and this experiment is going to be for naught. But the hope was to do a preintervention test, start doing the bionic fiber and really ramping that stuff up. Check in to see if I get some changes in my stool quality and all that and then do a follow-up later and see what happens with that and then also do some blood work looking at lipoproteins and thyroid and adrenal status and whatnot and see if there is any change.

Chris Kelly: Yeah.

Robb Wolf: Interesting. Well guys, what else, what else? My head is honestly spinning right now so. I was thinking this might be a 2-hour long podcast but right now, we may have tapped my cognitive functions out on this.

Chris Kelly: No that's okay and that was a lot, isn't it.

Robb Wolf: Yeah, yeah. Well guys, where can folks track you down on the interwebs and social media and whatnot?

Chris Kelly: So Tommy and I are running a program called O2 boost. You can go to O2boost.nourishbalancethrive.com and it's a program we're calling in clinical coaching. That term may have been stolen from Phil Maffetone but he seems okay with it and so I'm going with that clinical coaching.

So the idea is if you want Tommy and I to look at your blood chemistry, you can now do that. So you can place an order online and I will send you a PDF requisition form for lab corp and then you can go directly to the lab have some blood drawn and then optionally, you can do some organic acids testing as well and then when you have both of those together, you get a really good idea of what's going on inside your body.

The reason we're different from the doctor --actually let me tell you about my recent experience with a doctor because this is very funny. I've paid cash for a lot of tests over the last year or so because I haven't had any health insurance because I started my own business right. I finally pony up this \$638 from my monthly for the health insurance, I'm like okay screw this. I'm going to the doctor. They're going to pay for my blood work.

So I went to my local family primary care physician in the local sleepy town in the Redwood City near Sta. Cruz. He looks at this stack of labs in front of him on the desk and there's a thyroid panel on the top. He said where's the TSH and I had to point the TSH out and he said no, there's nothing wrong here. It's totally within the normal limits.

[1:05:07]

And then he pulls open his desk drawer up a pulls out a reflex hammer and then hits my knee and he sees there's a normal reflex. He says yup no testing required. There is no hypothyroidism and I'm just looking at him and like he's joking and he's not. He's deadly serious and that was the end of the conversation. No testing for you sir.

So to avoid that situation, if you're an athlete and you think you can get something out of testing your biochemistry but don't really want your doctor's permission, then this kind of O2 boost thing is like a really nice way to do that and the results come back to you electronically and then I get you on the phone and we talk for 30 minutes on what you should do next. We have to collect some details for our questionnaire and some other means, but that's kind of fun process to do.

Robb Wolf: Awesome. Say that you URL again and maybe spell it out for folks.

Chris Kelly: Sure. It's O2boost.nourishbalancethrive.com.

Robb Wolf: Okay great and we'll get that the show notes. Doc, where can folks track you down.?

Tommy Woof: Yeah. So I have a blog Drragnar.com and I write also for breakingmuscle.com. Robb, you kindly shared a recent article I wrote about using morning glory as a recovery tool.

Robb Wolf: Oh great.

Tommy Wood: To check. So if your morning wood has disappeared you're probably overdoing it in one aspect of your life. So people can find me on that too and on my website, there are a number of talks I've given recently including sort of an overview of systems analysis and root cause analysis I did for multiple sclerosis and some of the insulin resistance stuff should go out there soon at some point.

Robb Wolf: Awesome. Well you guys are doing amazing work like totally, totally amazing work. Definitely the next evolution in this whole Paleo ancestral health functional medicine scene. Really stoked for what you're doing,

very excited to see where it goes and hopefully, you guys can help me fix my little red wagon. Chris, I'm going to be humping your knee to get you to help me figure the stuff out so.

Chris Kelly: Yeah. No, that would be really, really fun. That's why I do this. I do it because I love it and yes so I love to see those test results and see what we can do.

Robb Wolf: Awesome, sounds good. Well Chris Kelly, Dr. Tommy Wood, honor to have you on the show. Looking forward to get you guys back and thanks for the wealth of knowledge.

Tommy Wood: It's been great. Thank you.

Chris Kelly: Yes perfect. Thank you bro.

Robb Wolf: Talk to you guys soon. Bye.

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