Paleo Solution - 217

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Robb Wolf: Howdy folks, Robb Wolf here with another episode of the Paleo solution podcast. We are here today with my very good friend and functional medicine expert's ninja of all things, biofilm related Dr. Michael Ruscio. Doc, I don't know if I told you but your first podcast was actually one of the most popular podcasts that we've had. So welcome back to the show.

Dr. Michael Ruscio: Cool. It's good to be back. Thanks for having me.

Robb Wolf: Oh man, I'm super stoked. We have a ton of ground to cover here but I want to hammer out our podcast sponsors super quick. FrontDesk, FrontDeskHQ.com is your mobile-based solution for service-based businesses, dog walking, crossfitting, yoga-ing, Pilates-ing. You will love FrontDesk. Check out those folks. They can set you up with a demo if you had not done that already.

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Finally Highlit.com. Highlit is just a fantastic athletic clothing provider. I was one of the early adopters on these folks. If you enter the discount code RW25, you get a 25% off of your purchase. So there you have it.

Okay. All that stuff is done. Doc, what's cracking?, what's new?

Dr. Michael Ruscio: Well the least medical related thing. I started doing a fencing class about five weeks ago and it was actually pretty fun.

Robb Wolf: Really? What got you into that?

Dr. Michael Ruscio: I just saw like a living social come through and I said Jesus this sounds fun so I shot a note to a buddy of mine and we've been doing it for about five weeks. It's fun and we have an instructor who's kind of like a Chris Farley Saturday Night Live character. So it's just perfect.

Robb Wolf: Nice, right on.

Dr. Michael Ruscio: Yeah.

Robb Wolf: So are you using foil, saber, epee, what are you using?

Dr. Michael Ruscio: Yeah we're using foils and we have like the mask and the jacket and all that jazz and you know, the first week or two is all footwork and then when we finally started getting the chance to spar or to fence it's pretty fun. It's actually a great workout too.

Robb Wolf: Yeah, yeah. I did a tiny bit of that actually when I was boxing and kickboxing because my boxing coach was actually a student of Ed Parker who was one of the Kempo, one of the big Kempo Karate guys. He actually gave a black belt to Elvis Presley oddly enough and but Parker was actually a really big fan of fencing and all the angles and the parries and stuff like that involved in fencing. He felt like that there were some really good applications with the boxing. I sucked sufficiently at boxing that I could never really get it to transfer. I was more of a catcher's mitt than an intercontinental ballistic missile but that's super cool.

Dr. Michael Ruscio: Yeah, yeah. How are you? What's going on on your end?

Robb Wolf: Not a whole heck of a lot. You know, we're 20 weeks pregnant here so gearing up for --

Dr. Michael Ruscio: Yeah.

Robb Wolf: -a second Wolf cub to arrive. Working like crazy on the cert trying to get that thing done before all hell breaks loose in late July or early August, going into jujitsu and just waiting for spring to really spring. In Reno,

yesterday it's been totally schizophrenic weather. We has snow, sleet in the morning and then it was 62 degrees by the afternoon and sunny and I --

Dr. Michael Ruscio: Wow.

Robb Wolf: --got a little bit of a tan. So yeah. So this thing --

Dr. Michael Ruscio: Kind of like a bi-polar climate you got going on there.

Robb Wolf: Absolutely which high desert that's pretty much part and parcel for that stuff so yeah. So you know, Doc when you were on the show last time we had a ton of folks interested in biofilms. I know you and I talked a little about that. We had talked a little bit about digging into some thyroid dysregulation. Where do you want to jump in on this?

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Dr. Michael Ruscio: Well maybe we can jump in with thyroid because there's some interesting stuff about iodine I'd like to talk about because I know that's a controversial issue and then maybe we can segue over to biofilms and then use that as a bridge to go into some other GI research I think is pretty interesting.

Robb Wolf: Very cool. Sounds good.

Dr. Michael Ruscio: So regarding iodine, I'm sure people have probably heard different opinions on iodine and I think there's kind of two polarized camps. One camp kind of like the guy Abraham camp, iodine is great for everything. Everybody with any kind of health condition should be on iodine. If you have hypothyroid, you want to be on iodine and you want to be on high doses, milligram doses of iodine. And then the other end of the spectrum, there's kind of the new age sort of Datis Kharrazian inspired, iodine can provoke autoimmunity and you should always avoid iodine when you have any kind of thyroid autoimmunity.

I think the actual truth to that lies somewhere in the middle and I just wrapped up writing this chapter on iodine for the book, which I may just end up releasing via my blog because well it's kind of long for a blog. But it's just really important information and I'd rather get it out to people sooner rather than later. But I'll kind of give you the synopsis and I want to thank Dr. Jeffrey Moss who's over at Moss Nutrition because he wrote an excellent, excellent series on iodine. He spent about two years just reviewing a lot of the iodine literature in writing, very, very objectively, very nonbiased. So his work was instrumental and then of course did a lot

of fact checking and kind of compared and contrast it with my own clinical research. So I guess I'll just jump right in and with any questions let me know. But I think it's been pretty well bore out by the literature that iodine increases thyroid autoimmunity. There's really no debate on that.

If you look at the literature gosh, you really cannot refute that and I've had a few people reach out and say I've uncovered some information that is contrary to that, to that line of thinking that so I'm saying --

Robb Wolf: Doc let me ask you a question really quick or what are the forms of iodine that we're talking about here like from kelp, from getting it from like sweet meats or you know like what are the – have all these things been kind of normalized for the form of iodine as well as the dosage?

Dr. Michael Ruscio: Well the most compelling data we have is when we add iodine to a food supply to help increase iodine levels in a population. So and usually that's iodide. There have been a number of studies using supplemental either iodide or iodine and interestingly when some of the researchers and a lot of research comes out of Asian countries that consume a high amount of seaweed, they've actually shown that seaweed is probably one of the most auto immunogenic if you will forms of iodine. So --

Robb Wolf: Interesting.

Dr. Michael Ruscio: -- I was thinking that you know, it's natural, it's probably the safest but some of the papers are actually showing the converse or the inverse of that. So it seems like iodide is the least potential to cause autoimmunity. Although some studies in fibrocystic breast disease with women who had a fibrocystic breast disease and Hashimoto's have used iodine. As long as they stay under a certain threshold dose they seem to be okay. So you can probably get away with either iodide or iodine but it seems like iodide is probably safer and it does – there are some studies that have shown for example… There's something known as endemic coastal goiter where people who live close to the ocean eat a lot of seaweed and there's something –there's iodine induced goiter that can occur there.

Robb Wolf: Interesting which is totally counter to what you would see with somebody living you know, like internal like India or something like that and they have a goiter induced from super low iodine levels.

Dr. Michael Ruscio: Well the interesting thing is that apparently either high or low iodine cause goiter.

Robb Wolf: Interesting. Okay. I was totally unaware of that. Wow.

Dr. Michael Ruscio: Yeah. And so the researchers have shown that by reducing seaweed intake they can have a pretty strong impact on reducing both goiter and autoimmunity in some of these patients. So yeah the high iodine can cause hypothyroidism through autoimmunity and also through nonautoimmune mechanisms.

Robb Wolf: Hmm.

Dr. Michael Ruscio: So but that's the point that was I was sharing before. There are numerous, numerous population studies that have shown when we add iodine to the population, we see goiter go down but we also see autoimmune thyroiditis increase. I think the important thing to look at when people are trying to figure out which one of these lines of thinking is actually correct you've got to look at large scale studies compared to small studies.

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A lot of times when people want to say iodine is good, look at this, you know, in vivo study where they gave rats this or they did a cell line culture study with that. You can't really put that kind of evidence above looking at 3500 people over ten years after adding iodine supply, after adding iodine to the food supply.

Robb Wolf: So that

Dr. Michael Ruscio: Does that make sense?

Robb Wolf: So like an example of that would be when like the United States started adding iodine to the table salt supply in pretty aggressive fashion.

Dr. Michael Ruscio: Exactly and then you would just look at the thousands of people that were monitored in that particular study and see what the outcome was. That kind of evidence really has much more weight than saying we did a short scale study with ten rats or something like that. So yeah I think that's been pretty well bore out. But the other interesting thing on the other side of the coin is one of the mechanisms through which the paleo diet may help with thyroid autoimmunity outside of the typical avoiding food antigens like gluten and dairy maybe because it's low iodine diet. I think a lot of people haven't really realized this and I didn't really fully appreciate this until I dove into some of the research.

But let's look at the top sources of iodine in most food supplies. Iodized salt which most paleo-ers are going to go to sea salt which is not iodized

and actually has a very, very low amount of iodine relatively speaking to iodized salt. Then dairy and then bread and then also seaweed. Then eggs actually are another source. So if people are doing the autoimmune protocol they're definitely coming out diary, bread, and eggs and those are three of the maybe five top sources of dietary iodine.

Robb Wolf: Interesting. You know, because I actually had thought that it would make sense to get like some powdered Kelp or something and throw that in some soups and stews every once in a while just to kind of hedge our bets on that. But that may actually not be the smartest route to go with this. Then it's interesting, we've usually looked at some of the immunogenic proteins in almost antinutrient type constituents in eggs but maybe that's barking up the wrong tree. It may be that we're reducing iodine input from that vector. That's really interesting.

Dr. Michael Ruscio: Yeah. I was really, really kind of surprised when I put that all together and I think for a lot of people some dietary iodine through kelp and things like that will probably be okay. But if you have Hashimoto's or any kind of thyroid autoimmunity, you probably want to be careful with that. I would strongly consider a low iodine diet for those people because there have been some studies even where they've put people on a high iodine diet. They've seen hypothyroidism occur, they've taken them off of the high iodine diet, hypothyroidism is gone away. And then they put them back on it again and hypothyroidisms come back. That kind of stuff is really compelling because I mean it's really hard to argue with that sort of evidence.

Robb Wolf: So what, you know, and I guess this will probably vary from say like a healthy non, autoimmune individual to somebody who's actually experiencing these symptoms but what's a safe iodine level that folks should be shooting for in you know, again it sounds like this may vary quite a bit.

Dr. Michael Ruscio: Well some of the research has shown that that about the upper tolerable limit is about 1100 micrograms so or 1 mg. So that's probably a reasonable intake that people will be okay with. Now for people who are trying to do a low iodine diet and kind of test this to see if it could be beneficial for them, it's usual under about 100 micrograms a day.

Robb Wolf: Hmm.

Dr. Michael Ruscio: So yeah that's kind of the range for which you have to work in. But yeah about 1100 micrograms is the safe operable limit and then in clinical studies, they've shown that as long as you are under about 10 to 15 mg a

day that seems to be kind of like the safe upper limit for repleting the dose. So that will be considered a higher intake of iodine, right? I'm sorry 10 to 15 mg, not micrograms, mg of iodine is way higher than the RDA.

Robb Wolf: Right.

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Dr. Michael Ruscio: So that seems to be safe. It's just the pro-iodine camp sometimes recommends 50 mg a day plus. That's where you start to see these things like hypothyroidism, whether it be fed by autoimmunity or just because of taking too much iodine. So that's when these things really seem problematic is when you go too high in the dose.

Robb Wolf: Interesting. Okay. Okay. And again like usually the only populations that we would see with a dose that high would be folks that are consuming seaweed as part of a traditional diet and they're just getting a ton of iodine from that.

Dr. Michael Ruscio: Yeah. That would be the most so or then then health nut who has symptoms of hypothyroidism and decides to go on iodine and had been taking iodine for five years and never questioned it but still don't feel very well.

Robb Wolf: Right. Right. And I mean it's generally contraindicated for folks too who have Hashimoto's to supplement with iodine. I think from the –you know, the mainstream kind of medical thing but to your point there are folks out there that say no, you should be taking much, much more but then you seem to be making a pretty strong case that the folks that are recommending these – I think it's easy to say that these will be super physiological levels that there may –you know, there may be some concern for that type of recommendation.

Dr. Michael Ruscio: Yeah, absolutely and two quick notes to that. I know last time I came on people were asking for some of the references. So what I'll do is eventually I'll try to put some of this information out via the newsletter. Because all the references are in the book. It's just it's hard to sit here and you know, --

Robb Wolf: Rattle for –sure.

Dr. Michael Ruscio: Yeah, yeah.

Robb Wolf: Sure.

Dr. Michael Ruscio: So and I do apologize for people who've been saying jeez whatever happened to Dr. Ruscio's newsletter? I haven't put one out in probably three months. I've just been absolutely enamored with stuff at the clinic but I'm getting back on the horse here and I will have some stuff coming out soon.

The other thing I wanted to touch on really quick is there's something known as the sodium-iodine symporte. That I think really helps us understand why especially some people that seem to do okay with iodine and other people seem to really react negatively to it. Because we do know like I just said that for some people iodine is going to be very detrimental. Other people seem to do okay with it however and one of the things that I think helps answer that discordance is the sodium-iodine symporte. The sodium-iodine symporter it's the doorway for iodine to get into the thyroid gland and it helps regulate iodine levels in the thyroid. So if your intake of iodine is low, the sodium-iodine symporter will increase absorption. If your intake is high then the sodium iodine symporter will decrease absorption. So it's a protective and a regulatory mechanism to make sure that your – whatever is in the thyroid in terms of iodine is the right levels.

But if that doorway, if that regulatory mechanism gets disrupted, then you can't regulate and interestingly inflammation and toxins are the two most common things that can derange function of that doorway. So when people are ill they should really make using iodine one of the last things they do. Because if you're ill, the likelihood of inflammation is extremely high and there's also a fair likelihood of some kind of toxicity. So you want to get rid of those factors first so that let's say if you start an iodine treatment program, if it's too much or too little for your body, your iodine and sodium – your sodium-iodine symporter will help be able to regulate your levels. I don't know if that's too deep.

Robb Wolf: No, no, no. No. It totally makes sense and you know we – you see a little bit –this is maybe a little bit of a stretch for analogy but folks will oftentimes they'll get some blood work done and their ferritin levels will be very, very high. And then there will be some concern that their blood iron maybe too high, folks may recommend that they undergo some phlebotomy and some blood donation. But actually what's happening is that if this person is sick, they have an infection or they have some gut permeability which is causing ferritin to sequester iron away because the pattern not only do we use iron for growth but pathogens use iron for growth as well.

This is where like some well meaning like World Health Organization people went into like sub-Saharan Africa, found all these people who look like they were anemic, gave them iron boluses and these people died from infectious breakout. Because you know they had overwhelmed their body's ability to get that iron away and then these pathogens were able to thrive. So you know, the body has a host of different protective mechanisms to try to keep whether it's iron or whether it's iodine within normal operating parameters.

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What you're saying which again this is something that I was unaware of, we have some systemic inflammation, it may actually dysregulate that symporter which would normally keep iodine within certain parameters. But then you know we could let's say have some gut permeability from gluten or from some – this is where it gets to me really interesting – shift work, stress, a whole variety of other things and then you actually can take an individual that wasn't in a position to have thyroid dysregulation from abnormal iodine levels. Now they will because of say like gut permeability and the gut permeability could come from a variety of factors whether it's overtraining, lack of sleep or like some sort of gut irritant like gluten or dairy.

Dr. Michael Ruscio: Exactly. Exactly. Yeah.

Robb Wolf: Interesting. Wow, wow.

Dr. Michael Ruscio: And the same thing kind of applies with iron. You really can't look at high ferritin and make any definitive conclusions for that. You have to look at the total iron binding capacity, serum iron, and also maybe their liver markers like ALT and AST. Then you can look at those and you can say okay, is this a pattern that is suggestive of hemochromatosis say or is it not. You know, and you can also run the soluble transferrin receptor to help elucidate whether or not this is high ferritin induced by an infection or not. So yeah it's context that's extremely, extremely important and that's one of the challenges with some of the educated patients that I deal with. You know, they know just enough to be dangerous right?

Robb Wolf: Right.

Dr. Michael Ruscio: More like I highly, highly applaud people going out there and researching these things but even for a clinician these decisions can be challenging and for a clinician this is all you do all day every day.

Robb Wolf: Right.

Dr. Michael Ruscio: So if you're just doing this as a hobby, yeah it's tough.

Robb Wolf: You can get in the deep end of the pool rather quickly yeah. I had some kind of weird inflammatory markers in my blood work and we saw high ferritin and this was probably like two, two and a half years ago. Saw some high ferritin, followed up on doing like the iron saturation and all the rest of that stuff because we were curious if maybe I had some iron overload. That ended up not being the case but then we dug deeper and we actually found that my TSH had inched up over time. Even though it was still on the lower end of normal for the population, it had more than doubled. It was heading towards like two and a half times higher what I had historically run at.

So then we did some different protocols to help with both adrenals and the thyroid and then those other inflammatory markers ended up going down and then I generally started feeling a lot better.

Dr. Michael Ruscio: Yeah, the context is huge. I mean one thing along the same lines Robb is someone does see the iron piece and they're a little bit worried about it. To evaluate if you have hemochromatosis or potentially hemochromatosis if you see serum iron high and your percent transferrin saturation high, your ferritin high and then your liver enzymes high along with a low TIBC that's fairly diagnostic of hemochromatosis. Or even if you see your percent transferrin saturation and ferritin high together you know, that's when you want to start maybe being concerned about hemochromatosis. If not, there's just a high ferritin and nothing else is funky, like you were alluding to before, see if there's anything else going on like any gut inflammation or potential infection, food allergies, what have you. Take care of that first, retest the ferritin and see if it's come down.

Robb Wolf: Interesting. Very, very interesting. Doc, so you know, what are some of the clinical manifestations of this thyroid story? Like when folks wander into your office, have they already been kind of fishing around with the thyroid issues or are they coming in with some just like general malaise and then when you're doing your basic blood work that's where this stuff pops up. Like how are you interfacing with this and how are people becoming aware of it?

Dr. Michael Ruscio: For the population of the patients in my practice that have thyroid issues, I'd say maybe 60% know they have a thyroid problem or highly suspicious of a thyroid probably more like 70% actually either know they have a thyroid problem or are highly suspicious. But really the way to view thyroid and this is one of the things I have to constantly educate my

patients about, is the thyroid doesn't just malfunction arbitrarily right? There's always a reason why. Oftentimes the most important thing you can do ironically coming back to the gut is address a gut health issue because that's going to be the primary source of inflammation. That's also going to be the primary source of perturbing the immune system.

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So sometimes I feel like a broken record where people come in and they're on levothyroxine and they still don't feel well, they still have all of these symptoms of hypothyroidism. They're thinking well is there another drug you'd recommend or should I be on cytonol with this and they're really just hell bent on chasing the symptoms. Oftentimes the first thing they'll say is well how is your digestion. Yeah, I'm constipated, have a lot of gas, okay. Well we need to –you know, we need to have a look there first because most likely that's going to be perturbing the thyroid. Oftentimes we don't even have to adjust the medication. Once we get some of these other gastrointestinal issues situated.

Robb Wolf: Interesting. Very cool.

Dr. Michael Ruscio: But then some of the other things Robb sorry to cut you off.

Robb Wolf: No, no.

Dr. Michael Ruscio: Some of the other things that we will look at depending on the person is we may look at their iodine levels. Because some people may need some iodine and we'll do a 24-hour urine iodine with creatinine ratio which I think is by far and away the best evaluation for iodine levels because you don't want to do a spot urine because that can be misleading. So you want to collect urine for 24 hours, which gives you a good indication and then also you want to have that relative to the creatinine ratio because essentially if the volume of what's coming out in your urine is abnormally high or low it's going to throw off the iodine reading. So when you index it to creatinine, you get a more accurate gauge.

I know that the iodine absorption test is one that is maybe kind of popular in the holistic community but if you read the iodine literature, that test is never mentioned. It's only mentioned by one group of iodine advocates and even when you look at it, the levels and the values used to set up the parameters of that test were completely arbitrarily --

Robb Wolf: Established.

Dr. Michael Ruscio: Established. Yeah.

Robb Wolf: Right.

Dr. Michael Ruscio: So not to say it doesn't have to any clinical utility but I think to really track your true iodine status and look at what the iodine researchers, the epidemiologists are using in the public health people are using that 24-hour urinary iodine with creatinine ratio is going to be the way to go.

Robb Wolf: Very cool. Very cool. And again using that creatinine, it's basically given you a sense of what glomerular filtration rate is so you know whether or not you know just the total throughput of the kidneys and then that gives you an actual index of what the iodine status is. Because we could have somebody who's dehydrated or hyper hydrated and so this gives us a benchmark for figuring that out.

Dr. Michael Ruscio: Exactly, exactly and it's not absolutely perfect but it's the best one that we have of a test that's available.

Robb Wolf: Cool. So how does this dovetail over into biofilms now, since folks just lost their mind over biofilms so yeah, yeah, yeah people are going to start making Dr. Ruscio biofilm t-shirts and stuff at the last show.

Dr. Michael Ruscio: All right. I'll give them one of those. So with biofilms and I think I did a video shortly after the last we spoke called updates on biofilms, and I've got a few cool slides here that I'll probably be presenting at the Paleo FX on biofilms. But essentially biofilm is either – were first recognized when prosthetic implants were being put in. Because that was an issue with some of these prostheses and then also in the mouth. Those are the two – you have dental biofilms and then surgical biofilms. As we started to learn more about them, we started realizing that biofilms have their hand in a number of different kind of infections. In fact I'm looking at a review article from the Journal of Elementary Pharmacology and Therapeutics were they have a nice table showing it's implicated with voice related infections, with periodontist, with chronic UTIs, with cystic fibrosis, with bronchitis, with otitis media, with chronic wounds, chronic rhinitis. Then of course there's other literature showing it with many different gastrointestinal infections and even some of the Lyme and Lyme disease associated co-infections.

So maybe one of the most basic things before I get to deep here is I couldn't practice on biofilms. Essentially the way it plays out is like this. When infections gets into your body, it's in what's called planktonic form. So things like plankton in the ocean just kind of disperse all over the place. When you're at that phase of the infection, they're relatively easy to treat because they're out in the open. You know, it's like if you are like

a sniper or something and someone was just walking down the street, you know easy target.

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When the infection becomes more chronic they form these biofilms. So they tend to aggregate you know, against walls, in corners so to speak and all these different fungus and/or bacteria, they can actually all aggregate together. Then they secrete these things called quorum sensing molecules and they're essentially like little signals they send out to see who's around them. When you get enough quorum sensing signaling to figure out hey there's a bunch of us here, they start to build this protective film over them that is highly impenetrable to antibiotics or herbal antimicrobials.

So that changes the game and what you see in some of the published literature is different researchers are saying hey we need to look at how we treat chronic infections differently. Because once you leave the planktonic phase, the game changes and just using an antibiotic is not highly efficacious because we haven't accounted for the biofilm.

Robb Wolf: Uh-hum.

Dr. Michael Ruscio: Interestingly when in a biofilm, these different bacteria or fungus, they can actually participate in what's called horizontal gene transfer or they can actually transfer resistant genes or other genes that are ideal for survival from one to another. Different members of the biofilm can all work cooperatively to achieve different protective functions. Some may distract the immune system or suppress the immune system. Others may participate in building of the film. So that's kind of some of the basics. Some of the more relevant stuff, there's a great study here from the journal of clinical gastroenterology and hepatology in 2010 where they had two groups of 20 patients, I'm sorry, I should say there were 40 patients that had chronic H. pylori infection even after multiple rounds of antibiotics.

So they decided to treat one more time and they divided the group up into two different sub groups. 20 would just have another antibiotic and this is actually a DNA-specific antibiotics so they culture the H. pylori to find out what would it be most susceptible to in terms of an antibiotic. That group just got the antibiotic. The other group was pretreated with N-acetyl cysteine and then had the antibiotic. Now here's the interesting thing. In the only antibiotic group only four out of 20 cleared the infection. In the pretreatment with NAC plus the antibiotic, 12 out of 20 cleared the infection.

Robb Wolf: Hmm.

Dr. Michael Ruscio: So just a simple pre-treatment with N-acetyl cysteine which is a mucolytic agent helps break down the mucus of the biofilm was able to vastly about three-fold increase the ability of an antibiotic to kill the infection. So the big take-away from that is when get rid of the biofilm, the infection is much more susceptible to treatment. Whether it be antibiotic or herbal, I would strongly speculate that it would make a big difference as long as you addressed the biofilm.

Robb Wolf: And if one had good levels of these antibiofilm agents as part of the diet or even supplementation say like if you're traveling. Like I'm kind of prone to chronic sinus infections so maybe that would be a time to supplement with the N-acetyl cysteine and might that help prevent the – you know, the insisting or the propagation of the biofilm to start off with and then allow your own immune response to kind of do what it does.

Dr. Michael Ruscio: Well it depends right? If you're trying to stop a newly acquired infection, then my opinion and again this is just my opinion. I haven't read anything published on this one way or the other. But in my opinion for a new infection it's not really that important because you're going to be in the planktonic state right?

Robb Wolf: Uh-hum. Uh-hum.

Dr. Michael Ruscio: So probably more important for a chronic infection if you were traveling and you were concerned about sinusitis and you wanted to take some antimicrobials along with some N-acetyl cysteine for a couple of weeks, yeah it's probably not going to be a big deal.

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Would it be absolutely necessary? I'm not sure.

Robb Wolf: Got you. Got you but that's where like basic sinus rinsing and good hygiene and all that stuff helps with that. But that's super interesting. What are some other agents either pharmaceutical or neutraceutical that are commonly used to help break up the biofilms? I mean are they shwizzling people with a detergent or something like that or I mean what's – how are they tackling this?

Dr. Michael Ruscio: Well what works best is if you lay down and you have someone burn sage over you.

Robb Wolf: Perfect.

Dr. Michael Ruscio: No, I'm just kidding.

Robb Wolf: So I need to move back to humble then is what --

Dr. Michael Ruscio: Exactly, exactly.

Robb Wolf: Perfect.

Dr. Michael Ruscio: You know, N-acetyl cysteine has been shown to be effective for H. pylori in a couple of clinical trials and also for chronic sinusitis, rhinitis sort of thing. So that's where the best evidence seems to like with NAC for that. Now for gastrointestinal infections, you can use chelating agents. You can also use of course N-acetyl cysteine. What I like to do is use something called InterFase plus through Claire Labs which has got a combination of some chelating agents, some ant mucolytic and some protein degrading enzymes. Oftentimes I'll use that along with maybe some N-acetyl cysteine or along with cemento and cemento the best evidence for cemento excuse me comes from some studies with borrelia or with Lyme disease. But I've seen with a few patients it worked phenomenally well for fungal biofilms. The other nice thing about cemento is it can increase a fraction of white blood cells which of course if people have low white blood cells, that can be helpful. So there's a number of things that you can use, different ones. I personalize different patients. If someone has got a history of more what I think maybe H. pylori and/or some sort of sinus biofilm, I'll use NAC especially if they have neurological complications because NAC is very good at helping to heal the blood brain barrier.

If it's a more gut central issue, I'll use InterFase and then maybe cemento along with it if I'm suspicious of Lyme or one of the lyme co-infections, I'll definitely use cemento along with it. Then there are some new kind of novel agents that I'm considering fooling around with. Salvadora persica is an herb that can inhibit quorum-sensing molecules. So I don't know how clinically relevant that's going to be but quorum sensing isn't really adequately addressed with any of the other items that I mentioned. I've had success nonetheless but I'll be curious to fool around with some of the Salvadora and see if that has any additional effect. Silver can also help, cumin can help, there's a lot of things that can help but those are just some of my kind of favorites.

Robb Wolf: Very cool. Doc, what else? What else do you want to cover today?

Dr. Michael Ruscio: Well I've got a really cool slide here I'm going to put out in one of the next newsletters where you can see a biofilm pre and post treatment.

They actually did a scanning electron micrograph and it's really cool because you can actually visually see the biofilm and see how it changes the treatment. So that's just a little anecdote. But yeah, more along the lines of gastrointestinal stuff, I shot you a slide I put together from the journal of nutritional reviews and I thought this was really interesting. I'm going to be speaking with the author of the study to try to get some more information.

But they did intestinal biopsies of two different groups of mice, ones that were raised in germ-free or sterile conditions and ones that were raised in germy or more kind of natural conditions. It was really interesting to see that the intestines, that the intestinal architecture changed based on the conditions. When mice were raised in germ-free conditions, the villi were actually thinner and longer. When they were raised in germ containing environments, the villi were shorter and fatter. Now what does that mean?

Well when you have a long, thin villi, you have increased surface area. Here's the interesting twist. Increased surface area will allow you to absorb more calories from your food and leave you more susceptible to infection.

[0:40:00]

Robb Wolf: Uh-hum.

Dr. Michael Ruscio: So in a germ-filled condition, the villi becomes shorter and fatter, they can't absorb as much calories but they do that because they are less prone to infection. So that's a really interesting mechanism that I haven't heard mentioned yet. A lot of the researchers focused on the macrobiota and this population does this and that population does that. It's very, very interesting. This speaks to something entirely different which is you know the amount and the diversity of the flora will actually change intestinal architecture.

Robb Wolf: And then nutrient absorption and also pathogenic risks. You know, it's interesting in Celiac one of the primary response is a flattening of the villi. Like they just virtually go away.

Dr. Michael Ruscio: Sure, sure and that mechanism I'm thinking is a little different because that's autoimmune.

Robb Wolf: Right.

Dr. Michael Ruscio: But --

Robb Wolf: But it's almost like burning the boats. You know, it's like --

Dr. Michael Ruscio: Yeah.

Robb Wolf: If there is –you know, there's clearly a response there and then you know, maybe to some degree there are some sort of kind of evolutionary hold over where an infection like that. Even though Celiac isn't an infection but something that's causing that type of inflammation then there's actually a pruning back of the villi to try to mitigate other problems.

Dr. Michael Ruscio: Uh-hum. Yeah.

Robb Wolf: Yeah.

Dr. Michael Ruscio: Yeah that's a very insightful point yeah and that could be.

Robb Wolf: Interesting. Cool. Well Doc, what else do you want to cover here? I just kind of wanted to open the floor to you and see what you were up to and --

Dr. Michael Ruscio: Sure.

Robb Wolf: -- do a check in. I know folks are going to love this stuff.

Dr. Michael Ruscio: Well yeah a couple other quick things and I've got so much in my head right now Robb, I can talk for like the next five hours. So just feel free to cut me off and you hung up whenever you're sick of me. But there – in terms of testing or gut infections, without giving any names there is a really predominant lab that I'm sure everybody knows that specializes in DNA testing for infections. There was a lab that I use but I'm using much less of because there was a report, an investigation published by a PhD at Loyola University. What they did and this really shocked me, they took healthy people, they took stool from 34 healthy people and then spiked it with infections. They spiked it with what will be considered clinically relevant level. So not that it's definitely considered a pathogenic infection and they sent them to this lab. The results were pretty remarkable. 15 of the 34 were reported as no ova and parasites so clear.

Robb Wolf: Wow.

Dr. Michael Ruscio: Of the remaining 19, 17 were reported as a parasite that we can't identify, which means you know, the standard response of that is it may

be a transient passerby. It may be some kind of nonpathogenic infection, we don't know. You know, it may or may not be a good idea to treat. Then for three, the infections were actually found. So there's been some changes in this lab over the past few months. I'm not sure if it was because of this paper but the validity of that testing in clinical practice has not been fully established. I have to admit that I was so excited about the potential that I just kind of went with it and I didn't really resist it. But after seeing this, it makes me much more speculative about new testing compared to older testing.

Robb Wolf: Tried and true, right.

Dr. Michael Ruscio: Yeah, yeah. So and I have noticed a number of patients, I'll be scratching my head because there's clear gastrointestinal involvement even after going on a healthy diet. Yet these screenings all come back negative. So I'm definitely suspicious and you know, hopefully that helps some people who may know what lab it is I'm talking about. The laboratory has made some changes so I think they're trying to do their best but you know, for what it's worth, without being too much of a negative Nancy that that's something that people may want to be aware of.

And then something else I've been doing a lot of research into is butyrate. Are you familiar with butyrate Robb?

Robb Wolf: Just you know, both from a gut bacterial fermentation and also potentially getting it at direct dietary source. Sure.

[0:45:01]

Dr. Michael Ruscio: Sure. Okay. So I've got some stuff on butyrate and then if we have time maybe some stuff on CIBO. But essentially butyrate is a short chain fatty acid. It's made by the commensal bacteria predominantly in our colon after fermentation of soluble fibers. I've been looking at butyrate as the potential clinical tool for IBD because in IBD, irritable bowel disease, the most common manifestation is our ulcerative colitis and Crohn's. In those diseases, one of the things that we want to do is increase short chain fatty acid production like butyrate. So how do you do that? Well you have fiber. But the challenge is that oftentimes these people's guts are so sensitive they can't really tolerate much fiber.

Robb Wolf: Uh-hum.

Dr. Michael Ruscio: So I started to speculate well what if we gave butyrate because butyrate can help and then once the intestines were more robust and more

resilient, we can segue off butyrate and then go to fiber and the fiber will help keep the short chain fatty acid production up.

So as they started looking into this, there's actually some very interesting research with supplemental butyrate, usually it's the form of sodium butyrate or magnesium butyrate or butyrate L-carnitine. But in one review, seven of nine studies showed positive change using butyrate in ulcerative colitis. So seven of nine studies is pretty remarkable. The sample sizes were small and there was no control group. So we can't you know, have too much of a party just yet but that's – I mean that's a nice benefit to be able to show things like reduced remission, positive histological change on intestinal biopsy from butyrate. Whereas the other option are some of these immunosuppressive drugs which even the conventional gastroenterology literature says are not the best options because of the side effect profile.

Robb Wolf: Right. Right.

Dr. Michael Ruscio: There was one study with Crohn's disease that showed some good impact, some positive impact with butyrate and some of the things that butyrate does is it's anti-inflammatory. It acts as fuel for the enterosites or for the intestinal cells mainly in the colon. It's been shown to help decrease polyps and potentially decrease colon cancer. Another really interesting thing is it helps potentiate what's called the ilial break. So you have the iliocecal transition. So the last segment of the small intestine to the first segment of the large intestine and there's iliocecal valve that helps to make sure the contents from the large intestines don't reflux into the small intestine. That's one of the things that can cause CIBO.

Butyrate has actually been shown to facilitate what's called the ilial break which is – essentially it helps turn on the iliocecal valve so that stuff from the colon can't reflux into the large intestine because you don't want stuff in the colon getting back into the large intestine. The main reason for that is the bacterial count in the colon are about 10^{10} to 10^{15} whereas the bacterial count in the small intestine are about 10^{0} to 10^{3}. So there's so much more bacteria in the colon that shouldn't be getting into the small intestine. One of the things that helps prevent that is this ilial break or the iliocecal valve which is enhanced through butyrate.

Another thing that's noteworthy is there's something called a G-protein coupled receptors or GPRs and they help alter the immune surveillance toward colonic microflora. In both Crohn's disease and ulcerative colitis but more so in Crohn's disease one of the mechanisms, one of the pathophysiological mechanisms is the body starts attacking commensal

flora. That's why one of the lab markers used to diagnose Crohn's is the saccharomyces cerevisiae antibodies so you start attacking your own commensal saccharomyces population. So butyrate has been shown to help with these G-protein coupled receptors that help modulate how aggressively your immune system targets your own good flora. So is any of that making sense?

Robb Wolf: Yeah, yeah totally. So --

Dr. Michael Ruscio: Okay.

Robb Wolf: --would a dietary source you know, like pastured butter would that be an option or do we really need some sort of like an isolated you know, like butyrate salt like you mentioned?

Dr. Michael Ruscio: Well my thinking is and maybe you can tell me specifically, the clinical studies have used about four grams per day and I'm assuming to get that through a dietary source is going to be near impossible.

[0:50:19]

Robb Wolf: Got you. Okay, okay.

Dr. Michael Ruscio: But maybe the best way like a lot of my clinical approach is we use the sodium butyrate for a short period of time. We get someone healed up and then their maintenance is increased soluble fiber and increased butyrate containing things like butter.

Robb Wolf: Okay.

Dr. Michael Ruscio: So I think that will probably be the most reasonable approach. And then what are your preferred fiber sources? You know, like resistant starches had kind of a revival or a discovery within the paleo scene lately and folks have used like a potato starch, tapioca starch? What are your preferred kind of sources for goosing that endogenous butyrate production?

Robb Wolf: Sure.

Dr. Michael Ruscio: Well that's something I'm really intimately researching right now and I haven't come to any definitive conclusions. But I think a mixture is probably going to be the best because --

Robb Wolf: Okay.

Dr. Michael Ruscio: --different studies show that you know, this inulin for example will feed fast fecal bacterium-P which is shown to help prevent a relapse of Crohn's. So inulin I think is good. You know different fod map containing prebiotics but then the challenge there is people with IBS don't really tolerate fod maps. So the direct answer to your question before I get on too much off a tangent is I think there's going to be some individualization that's going to be necessary.

Robb Wolf: Sure.

Dr. Michael Ruscio: Short term you're probably going to have to clean up some stuff before you can go very heavy with the prebiotics. And then when you get things cleaned up initially, probably the best approach is going to be a mixture of a variety of types of prebiotics with maybe some special consideration to the fod map prebiotics and just trying to sniff out which ones may not be well tolerated for you.

Robb Wolf: Damn customization and lack of a one-size-fits all approach. I'm deleting this thing. This podcast is worthless.

Dr. Michael Ruscio: Get rid of it. Get rid of it. I would burn it if you could. But the other thing there just to reiterate is as I think the most hazardous thing maybe you want to be careful with is just the fod map containing prebiotics because the low fod map approach has been shown to be very effective in clinical trials for IBS, very effective.

Robb Wolf: Uh-hum.

Dr. Michael Ruscio: And the interesting thing is that when people avoid fod maps for four to eight weeks their fod map tolerance increases. So it's kind of like you're saying like with a lot of the other stuff, you know, come off of these foods that maybe noxious, let your intestines heal a bit and then start reintroducing and usually --

Robb Wolf: See how you can do.

Dr. Michael Ruscio: Yeah. Usually you'll be able to be more tolerant and then one of the things – sorry to have a run-on sentence here but with going back to butyrate for a minute, I just want to make one caution. There is something known as a butyrate paradox which essentially stays and this is not 100% conclusive but it seems that people with healthy intestinal tissue responds negatively or may I should say may because this is not conclusive. But people with healthy intestinal tissue may respond negatively to butyrate but people with pathological intestinal tissue, IBD,

ulcerative colitis, Crohn's, respond favorably. I just want to throw out that that qualifier because I don't want people who are fairly healthy but like yeah you know, how can I get that last inch of performance.

Robb Wolf: Right.

Dr. Michael Ruscio: Let me try butyrate. I don't think it's for that population.

Robb Wolf: Interesting. That's a fantastic point because I would have been that person that would go out and start snorting sodium butyrate or something. So yeah. Yeah. Well Doc, I am somewhat double booked today so we're going to have to trim it there because I am rolling into kid duty here in near moments. But let folks know where they can track you down both your YouTube channel and your website.

Dr. Michael Ruscio: Sure, sure. So my website is DrRuscio.com just DrRuscio.com and keep your eye on that site because it's going to be completely revamped in the next month. I'm going to have a clinic store with kind of like a do it yourself home treatment section to help people who maybe can afford to work with a functional medicine doctor. And the YouTube page is YouTube.com/MichaelRuscio. Then I did launch a thyroid specific site that's PaleoThyroid.com.

[0:55:05]

Robb Wolf: Oh nice. You didn't tell me about this. What the hell.

Dr. Michael Ruscio: Sorry. You know, I'm black-balling you Robb, I'm sorry.

Robb Wolf: Okay, okay. Nobody tells me anything anymore.

Dr. Michael Ruscio: Yeah. And on that site it's I try to get everything up there as neatly as possible. There are some things that are a little bit kind of out whack. But the first several chapters of my book are there as kind of a preview and then there's a video version of each chapter all on thyroid. So that's that and then the newsletter like I said if you guys go to DrRuscio.com and sign up for the newsletter, I will be getting back on the horse with that to try to keep people abreast with all this stuff and I'll be speaking at Paleo FX and looking forward to that. I'll be doing a talk called What to Do When Paleo Fails kind of going through how to – what context to put all this stuff into testing, treatment, and all that and that's pretty much the gist of it.

Robb Wolf: Fantastic. Well Dr. Ruscio and I will be drinking NorCal Margaritas and probably starting a bar fight at Paleo FX.

Dr. Michael Ruscio: [Laughs]

Robb Wolf: It's going to be a good time. I'll be hiding behind him after the frackus ensues though.

Dr. Michael Ruscio: Looking forward to it.

Robb Wolf: Awesome. Well Doc I'm super stoked to have you on again. I know there's going to be a ton of questions. Let's gun for two or three months down the road and we'll get you back on for the third installment. Let's make this a regular gig.

Dr. Michael Ruscio: Yeah sounds good. Thanks for having me on again, Robb.

Robb Wolf: Awesome, Doc, will talk to you soon.

Dr. Michael Ruscio: Okay, take care.

Robb Wolf: Okay. Bye-bye.

Dr. Michael Ruscio: Bye-bye.

[0:56:30] End of Audio