



Transcript of “Uncovering Resistant Starch with Dr. Grace Liu”

Bulletproof Radio podcast #117



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Dave: This is Dave Asprey Bulletproof Executive today's cool fact of the day is that the origin of the phrase "Bring home the bacon" goes all the way back to the year 1,104 to a small English town called Dunmow. In the Dunmow Flitch trial couples are promised a Flitch or a side of bacon if they can satisfy a judge and a jury of 6 bachelors and 6 maidens that during the last 12 months and 1 day they have not wished themselves unmarried. These bacon trials are still held every 4 years and your next chance to prove your love and get your bacon is in 2016. I'm not sure that I'm going to start saying, "Hey do you have a flitch of bacon", but apparently, that's correct.

If you're watching this or following this on [YouTube](#), hey, thanks a ton for taking a look at the new official [How to Make Bulletproof Coffee](#) video on line it just hit 50,000 views and I would just love it if it hit 100,000 views. Please check out the [Bulletproof Executive Channel](#) and just click like if you actual like it this Podcast is available there as well. Today's guest is Dr. Grace Liu you may know her as Dr. B G Animal Pharm. I first met Grace back oh about 3 or 4 years ago with Richard Nikoley at dinner at my favorite steak house in Silicon Valley called Birk's and they do serve a grass fed steak, but it's only the filet mignon.

They also serve oysters in fact I watched Richard Nikoley throw up an oyster it was very exciting that night. If you don't know Richard Nikoley, Richard runs what's Richards's blog I'm blanking on it. Grace?

Grace: [Free the Animal](#).

Dave: Thank you [Free the Animal](#) I was like free the something, but it's not free the Paleo there we go. Richards a well-known guy and Richard's big thing lately has been resistance starch and how maybe this is the missing link in Paleo and other Paleo figures have talked about it. I've done an experiment on myself with it and Grace is here who has a serious background in the pharmaceutical world who writes a technical and just good blog about the various scientific nutritional and pharmacological ins and outs of our health including 4 years of plant biology. You'll

find a ton of info on her blog and you'll also find a ton of info in this interview with her. Grace welcome to the show I'm stoked to have you on.

Grace: Oh thank you I am too I've been looking forward to this.

Dave: One of the things that gives bio-hacker cred in my book is that you lost 50 pounds of fat by eating a Paleo like diet and you even got nutrition certified by Robb Wolf.

Grace: That's truth.

Dave: That's so cool anyone who has lost more than about 25 pounds by hacking their health has gone through a personal journey that makes them more aware of what their capable of and what others are capable of and the fact that you have real scientific training backing you up is also impressive.

Grace: Oh thank you.

Dave: You are also in some remote part of the world where are you today.

Grace: I've been in China this our third year we're in Shanghai.

Dave: You're actually in Shanghai proper.

Grace: Yes, yes normally we would be there we go back every summer.

Dave: Lovely and I'm on Vancouver Island so it's sometime for you I'm not sure, when for me it's middle of the night. I'm wearing my cool bio-hacker shades keeping the lights a little bit reddish and dim so if your all watching this on video you know why I look a little bit more like a...

Grace: Yeah I love your cave.

Dave: Yeah it looks more like a brothel at this time of night because of the red lights but hey, we'll go with it.

Grace: I don't mind you look great yeah...

Dave: Oh thank you.

Grace: It's been a long time yeah.

Dave: It has you're looking very healthy to which is cool because in Shanghai I was there a few months ago and the air was so thick I'd never seen it like that in my other visits. Are you feeling it in your lungs or are you good.

Grace: You know it's all new it wasn't really so bad ah, but I think the industries have really cranked up and yeah some days I do feel a little tight, but it's yeah.

Dave: Okay we'll let's just jump right in about resistant starch because a lot of people unless you're really up to speed on the Paleo side of things you probably haven't heard of resistant starch and there are 4 kinds of it. For people who are driving in their cars listening who know something about eating maybe, but aren't really up to speed starch, resistant starch, soluble fiber, insoluble fiber give us a run-down from a pharmacology nutrition point of view.

Grace: Okay actually there is a lot of plant biology behind resistant starch the way that resistant starch is molecularly designed it's helical it's a lot like our DNA which is one of our the most compact pieces of a machinery actually. My theory is that plants that have high protein and are able to protect their little plant babies have higher amounts of RS if you look at it a resistance starch is higher in whole grains, whole beans, whole lentils, tubers anything-underground storage related. This is very similar to C4 and C3 actually in terms of the content inulin and other fibers like fructans.

I think its nature's way of being an anti-disease because during the last couple millennium the way these plants could survive is if their babies could withstand cold and have high cold tolerance. These fructans during the cold this is how they increased their way of survival so RS1 is in the outside of a plant baby like a tuber or a bean or a whole grain those are the main ones with outsides and it's very hard to break. Our enzymes cannot break them down and some of the microbial ones and then RS2 is just starch usually it's the raw one uncooked so the big popular one is the white powder in starch straight RS2.

RS3 is cooked so it gels out into usually a liquid sub straight and then during cooling it congeals up and makes it a little harder for as a carbohydrate that raises our blood sugar we call this net carbs right. Once it congeals, it's actually a fiber, we can't

break it our enzymes from our mouth and our pancreatic enzymes can't break it down and ...

Dave: That was RS3 right.

Grace: Yeah RS3 and the thing about RS3 is that if you reheat it or it's cooled and then cooled and reheated multiple times you do this the harder it is actually for the enzymatic degradation process by the microbial amylases so believe it or not it becomes more and more of fiber so carbo rice is one of them. They pick the rice and they heat right they cook it right on or something and then they cool it and then it's packaged up and that actually has a higher RS total because of the RS3 compared to other forms of cooked rice.

Dave: Then what about RS4.

Grace: The last form is RS4 it actually doesn't exist in nature it's almost like a synthetic pharmaceutical. It starts in the factory or chemical lab. They add some kind of molecular moist parts of enzymes to break down they do this to a lot of pharmaceuticals usually to make it long lasting they add halogen you know drugs can't be broken down by our body we halonate make them. These actually are the most toxics drugs actually with the halogen removed reactive is, but for food I don't actually remember the that they stick on it could be or something, but it just makes it harder for the enzymes to break down they tend to last longer.

Dave: That makes a lot of sense so we have and this is funny because in the Bulletproof Diet like a protein is not a protein the difference between an egg white and spider venom they're both proteins their just different they do different things. Now we talk about carbs and then of course we have sugar we have fructose we have all these other things like and then starch, but then it turns out with starch we don't really have starch we have 4 kinds of resistant starch and some non-resistant starch right.

Grace: Yeah and it all depends on temperature and breed and it's all the way more complicated then what I learned in school on Nutritional Science as an Undergrad.

Dave: Let's zoom in on the resistant starches why should anyone care about resistant starch like what's the big deal is it just another kind of fiber.

Grace: It is not just another kind of fiber probably if you look at the evolutionary data, which is actually strong, and big. Our ancestors probably ate resistant starch in the form of underground tubers for millennia if not even billions of years perhaps.

Dave: Were they eating like raw yams you're talking about or was this something else.

Grace: Probably a non-toxic thing I mean I don't know how I don't know actually all the varieties of yams I know some of them are toxic, but there are non-toxic Sedge Nuts okay which are like the Tiger Nuts these grew all over Egypt and Africa. They're apparently delicious with Egyptians were one of the first to do crops and they did crops of Papyrus they didn't just make this paper, but they were eating them it's like one of the first crops on earth actually.

Dave: Oh, wow.

Grace: They're nutritious full of protein and all kinds of goodies so underground storage units include even wild carrots they have RS in them as well as all kinds of other kind of fibers. If you look at cattails and even nuts like acorns, you eat a fair share of some nuts right that they have a little bit of RS in them. If you have a problem with nuts, but in the primitive days toxic, but there were some that were not. For millions of years I believe many of our ancestors including our primate ones that even baboons now they learn how to dig underground Sedge Nuts and Tiger Nuts and other underground storage tubers. We were not the first we follow actual primates and through evolution we were able to get more carbs this way there was a shift primates probably got at least half of their energy from fermenting fiber.

They just don't have much in terms of pancreatic enzymes to break down carbs they got a lot of their energy from fat, but it was from microbial fermentation the microbes would break it all down then covering it in fat, but our brain got bigger. As you know we have a brain in our gut and if both are broken, that's a big problem. That ties in with the gut so underground storage organs they're full of resistant starch and there is no doubt in my mind that we have evolved how we are eating them and if you look at the primary core microbiome the microbiota.

The main ones that are associated with anti-inflammation and high amounts of butyrate production, which is one of these saturated fats 14 saturated fats their preferred food is actually butyrate. They love to make butyrate, but they make it

from resistance starch. If you give them different kind of fibers it's a resistance starch that they will break down immediately super-fast ultra-fast.

Dave: It was that butyrate thing that got me all excited because one of the reasons that I put butter in [Bulletproof Coffee](#) is butter is one of the biggest dietary sources of butyrate other than if you eat fiber that ferments in your gut. A lot of people I've find don't ferment fiber very well in their gut to make butyrate.

Grace: Possibly do you think for millions of years we were eating butter though I'm not sure see that's where I ran into one of my first evolutionary quandaries.

Dave: No of course we didn't and the problem there is that in a modern world we do all sorts of things that we probably shouldn't have done and we've changed the soil and the gut biom probably permanently. I notice that I benefit and others benefit both cognitively and even in gut health by having more butter in the diet. That was the okay does it work and certainly we didn't evolve to do almost any of the things we're doing even sitting here at night talking over Skype.

Grace: Yeah possibly, so evolution plays a big role because diet drives everything right.

Dave: Yeah.

Grace: We've seen with all kinds of examples. Diets one of the biggest drivers and maybe we're changing our diet there are some theories that our brain has shrunk our cranium is about 10% smaller.

Dave: Oh, wow that's interesting.

Grace: You didn't come up with that. We need to upgrade that and make our brains and craniums a little more bulletproof. Something has really changed, but I don't doubt the diet we follow will protect our ancestors I mean our children now.

Dave: That was the whole [Better Baby Book](#), but one of the problems that I ran into in that is that some of the recommendations can make your child's head so large it won't fit through the birth canal. It's like we have the power to do it, but we also have to have moms who are well suited to having large headed babies or we have to address it right after the baby comes out and then crank up the fish oil and stuff like

that. It's like becoming a little bit exactor like how big of a whole do you have to go through.

Grace: What a wonderful problem to have.

Dave: Isn't it great.

Grace: I know that that's because every generation are hips are getting narrower. There's been some studies about that it happens to be the vitamin D, sunlight, grains...

Dave: It's just not right.

Grace: Grains provide vitamin D. It's interesting you bring up butyrate because you know Stanley Bruchosky right Burzynski, Burzynski his fame is pure for a lot of refractory brain cancers it's actually a B-rate derivative. See and who gets cancer people with broken guts they're no longer able to ferment or make butyrate. Their brains broker and their guts broken.

Dave: Let's talk about how the body process starch then into butyrate and the other ways it processes starch. If you're that average person listening to this and maybe you ate some mashed potatoes, which are full of starch, but have almost no resistance starch what happens in the gut. What walk through what would happen and then let's walk through what would happen with a resistance starch in order to help or maybe even a vegetable to help you make butyrate?

Grace: Okay that's great there's many kinds of potatoes and you know all the heirloom potatoes from South America, Europe, blah, blah, blah ah they are far different then American multicultural white potato right. If you're talking about just a regular white potato that GI is actually hard in what table food it will raise blood sugars faster and higher than table food. If we're talking about that one that's clearly worse than shoveling table sugar or snorting it. The way we break it down if we were eating like mashed potatoes from a white normal American potato we are chewing our amylases start working on breaking down the starches depending on your genetic background. You may have a high copy of amylase or a low copy people who tend to eat more and the person who diet of like tropical probably my ancestors because I'm Chinese.

You're going to have more amylases and you'll start as soon as it starts hitting the pavement it starts getting broken down. By the time, it hits your stomach and intestines there's been massive digestion going on usually if there's a healthy gut. Anytime there is an unhealthy gut like heartburn or GERD any kind of SIBO small intestinal bowel overgrowth anyone taking NSAID's breaking down the gut there's a backflow. Some people don't there's already some brokenness you're not going to get a full digestion I see this actually in a lot of the cultural medicine panels the pancreatic enzymes are like elastase is below 500, 100, 200 it's pathetic. Okay so it hits your small intestines everything's go then all the complex carbs can be broken down from disaccharides complex carbs, down to the simple glucose.

Then we can get it up regulated up regulated into our body and straight across that one cell barrier and across glucose transport and all these things and then it goes into triglycerides and then it goes into our bloodstream and to the [inaudible 00:16:22]. That's just the potato and then any fiber left you might if it's a white American potato then it would be shuttled down to the colon for um the cecum and the large intestines so microbial fermentation. Now if you let's say you have you either put 1 or 2 tablespoon of cilium or 1 to 2 tablespoons of potato starch while it's cool the temperature makes a big difference we can easily make potato starch or any other kind of raw RS um cooked and then it's going to raise our blood sugars.

Okay so for the white potato and now it's in the small intestines were seeing the blood sugar go do, do, dod because the net carbs is exactly almost as much as the grams of carbs well not exactly there is some [inaudible 00:17:05], but with fluids and so it will go up. Now if you have potato starch fiber or cilium they both buffer the way they lower the GI of the carb food and so we get this dampening the blood sugars don't rise as rapidly. The funny thing about potato starches I don't fully understand at all and it's been totally broken down.

Some of the receptors that if we start getting fermentation going on butyrate around the cecum and small intestines so this is like an hour hour and a half into digestion it will hit the GPR receptor it's almost like a P-par obsessive official. I'm sure you're aware of how Omega 3 the mechanism is it hits.

Dave: Grace I'm definitely a huge P-par fan boy, but I'm sure our listeners just got lost.

Grace: Yeah okay.

Dave: Just assume that A they're paying attention to the car in front of them and B they probably don't know what P-par is. Backup just a bit, about what's happening so you had the starch break down the glucose in the gut and there was some fiber left over and what happened to that fiber like it does some different things.

Grace: Resistance starch there's no end and all [inaudible 00:18:17] and some of the soluble fibers...

Dave: The so called Pre-biotic that you can buy.

Grace: Yeah their Probiotics or a lot of green vegetables, whole grains, and whole beans the cecum there is a lot of bacteria in there it's like a little house for our favorite little microbes in case things get wiped out in ah in a monsoon this is like the reservoir like a silo. The bacteria in the cecum will start doing their little job making beer for I'm just kidding. You start fermenting and they make ah saturate fats for us and one of the butyrate the 4-carbon saturated fat it's like Omega 3.

It's like another fat it will bind a receptor and these receptors have to elucidated one of them is the ketone receptor GPR 109A used to be known as Puma G animals and there has been various other names HN something, something. I used to be really into this I thought the only way to access this was Ketones, but I was wrong.

Dave: Butyrate and...

Grace: [inaudible 00:19:17].

Dave: Ketones access ...

Grace: Yeah because...

Dave: Bulletproof coffee.

Grace: Ketones is beta hydra and a normal psychology living right you hit butyrate we hit ketones when we're doing extended exercise which [inaudible 00:19:33] I believe we involve doing because we had to build houses and carry water and carry babies. Maybe women are a little better for some stuff while forging. Then babies are the first students of life and they switch the metabolism and there are other states sometimes pregnancy. I have 2 chance of being pregnant you know I was in [inaudible 00:19:52] so I think there are certain states like maybe

high cortisol states. That's debatable you know how healthy that is long-term having high adrenal high adrenalin and cortisol states. Butyrate and hydroxyl the hydroxyl butyrate ketones they share multitude of the receptors they get and ones their GPR and one and IH the other one is GPR 41 and 43 basically called some fatty acid and receptor these are huge anti-inflammatory receptors and it's mainly [inaudible 00:20:23].

Dave: Their huge their huge anti what ...

Grace: Anti-inflammatory receptors.

Dave: Anti-inflammatory okay cool.

Grace: They work all over the brain all over the immune system especially our gut is one long lymphoid tissue so other than bone marrow and antibodies we have floating around our gut is the immune system. Some thinking I believe in 90% of our immune system is the gut so whatever goes on there will completely determine where our food allergies are. Whether the guts sealed what's living there what's modulating in it whether there's a friendly bacteria that normally are there if they're not there they are apex predators and when they're not there the vermin takes over. We have to have this core commensal microbial to have and were finding more and more like in Autism studies ulcerative colitis studies and c-diff colitis studies.

We're finding out what it is not there because what brings it in there well talk about that later, but there's core for microbial and once they get in then everything goes away Autism goes away c-diff colitis goes away all the repetitive weird behavior. I am kind of asking and I can tell when my old symptoms come back if my guts not doing well [inaudible 00:21:33] these all effect the gut. Finding all these trends recent studies and it all has to do with the gut and what the commensals are.

Dave: You and I are in total agreement that the gut is at the core of an enormous amount of both health problems as well as unlocking some human potential there. You just said doing something about Autism, I'm speaking at the Autism One Conference coming up here, and I'm keenly interested in fixing the gut both in Autistic kids and in Autistic adults. In my own path, having had ADD and the symptoms of Asperger's syndrome and things like that and there is a gut connection, but are you saying that giving these kids more resistant starch is going to reduce their symptoms or is it a little bit more complex than that.

Grace: Oh, I have no doubt the gut of an Autistic child they've shown through genes, atom studies and Hi are you there?

Dave: Yeah it looks like we had band ...

Grace: Oh sorry.

Dave: That's okay.

Grace: Yeah sorry about that I can start all over though.

Dave: Okay so I was just asking the question about so are you saying that resistant starch is something that Autistic, kids would benefit from what's your take on that.

Grace: That's a loaded question Dave because it depends on what's in the small intestines.

Dave: No I just said oops because it's not because we had audio problem just because yeah it is a loaded question right and so maybe I was spoon feeding it to you, but okay so depending on what's in the gut, but if you give yourself resistant starch how do you know what's in the gut.

Grace: Well you can check so if you take resistant starch and you're getting adverse effects you have something in the gut that shouldn't be there it's broke. Because evolution wise we should tolerate resistant starch fibers and anything in food unless were like drastically for some reason vaccinated against and that's what happens when we have a leaky gut we vaccinate ourselves which is retarded it only happens in modern times. I have Gluten and Dairy like problems because if our gut is perm non-permeable or just selective permeable the way evolution intended then we would not be putting in all these antigens into our blood and essentially vaccinating ourselves.

Dave: Well even if your gut is non-permeable and you don't have a Gluten sensitivity there is solid studies about Gluten reducing blood flow to the brain.

Grace: Oh [inaudible 00:23:47] with this I mean I think there was a recent study about ancient salt there wasn't so much issues in even celiac people. I didn't really look at that study, but I believe that it really depends on the quality of the gut integrity of the mucosal membrane the tight junctions and barriers.

Dave: We'll cut over to my own resistant arch experience because you might have some comments on that and we'll go back to this generalized okay how do you control what's going to grow when you feed it resistant starch. I consider Richard Nikoley a friend, I'm a fan and I just like what he does, and he's just a funny guy. When he starts writing just pages and pages of all of these RS posts that are really well cited I'm like oh this is great. I read them I wrote up a piece on the Bulletproof Blog and I went out and I did my experiment. I'm potato sensitive I know the lectin bother my joints. I was like oh I'll try potato flour so I tried potato flour for a few days and I started getting rashes I'm like all right that's fine I'll do what Richard recommended which was take a potato starch rectally because it doesn't cause those problems then, but it allows fermentation.

I noticed some improvements when I did that and I was doing that while I waited for my plantain starch to arrive, which is another common source. I did the plantain starch for 2 weeks and I started getting hives and my allergies came back and their still back like 3 months after I did this where my seasonal allergies are much worse than they were. I feel like I really didn't win on this experiment I didn't even go 30 days on it. I did get my comprehensive stool analysis I didn't get it right at the end of that I did it I don't know maybe 6 weeks after I finished the experiment my total saturated or short chain fatty acids were 6.3.

Within limits, but towards the lower end of it and my butyrate was 1.3 and it goes up to 3.8 on this scale this is from ah Doctor's Data Labs. How would you interpret that I tried 2 different sources of RS I did try the UCan stuff which is another kind, but I was kind of underwhelmed it made me less happy like from a gut perspective and my kids laugh riotously because I couldn't stop farting. What's the take on that Dr. Grace?

Grace: Okay well we've seen a couple failures their not very common but I've seen failures in the way that the health is not recovered their still like all these little things. For instance, Richard's sinuses once he added the Probiotic I think he properly filled up the commensals that was small intestines for them to do their job and clear out and improve integrity of the barriers and the [inaudible 00:26:36] improvements that were seen, but there are a couple cases like yours as well. People have flares if they high [inaudible 00:26:43] people have had rashes too some of those big bloggers like Fred Hahn he had immediate problems as well.

That just signals to me that you know what these people have intestinal issues and I love the TDSA's the test that you did, but the problem for me is that they accurately describe sometimes what's overgrowing because they do it by culture. You know the data pre 1998, 1999 their all culture so back then they thought the gut was full of [inaudible 00:27:12 lipida] and lacto, but that was like so wrong now they've realized they only got 5%. Let's say you got a big elephant and you can touch only one thing and your blind you know you're just touching like the leg you totally miss the tusks the head the ear right so you miss the whole picture. By looking at a DNA/RNA perspective you know it's a live so using I prefer the test the Genova Diagnostics I think I wrote you that, that's a much better preferable test because you can use RNA data to know it's alive. You can kind of tell what's going on it's imperfect it's also better to get a urine analysis you can know an organic acids and see what's growing out. Because fungus does not culture as because you're a fungal [inaudible 00:27:55], but I had huge amounts of fungus, it could not be cultured out, and I had gone with a TSA it would have been totally wrong, but with your ...

Dave: What kind of fungus what did you have do you know?

Grace: It was candid not any weird [inaudible 00:28:07].

Dave: It wasn't Candida Krusei it was just Candida Albicans like the kind of run of the mill stuff.

Grace: Yeah, yeah.

Dave: There is like 1,000 of varieties of that one, but okay.

Grace: It couldn't tell me the [inaudible 00:28:15] I had like already full toxic you know or if it was benign, but when it gets to [inaudible 00:28:20] not benign, but with your end you can tell if it's overgrowing if it's seeping out into the bloodstream and then thus to the urine. The d-retinol would be off the chart you can do organic acids tests. Usually once the small intestines is [inaudible 00:28:35] yeast you got everything else opportunist growing there because the yeast only grow there when the commensals are gone. Either by low carb or by antibiotics or gastroenteritis there are so many [inaudible 00:28:48] eliminate these commensals in the small intestines or they're really the guard for the small intestines.

Dave: Well in my case, there was something else growing there and I haven't actually talked about this on the Podcast yet. Over the past like 9 months, I noticed I was getting love handles and I'm doing the Bulletproof Diet right this thing is rock solid for like years it's just idiot proof. I'm like okay I've got and some days are worse than others, but like there is something going on. I'd cook carbs I'd add carbs I'd tweak things and they just wouldn't go down and they found I had blastocystis which is a parasite that you pick up when you travel internationally a lot and I'm like traveling all over the place.

Grace: Absolutely.

Dave: I did a month of...

Grace: Everybody has blasto everybody.

Dave: I apparently have a lot of it and I did a month of Flagyl and like oh my God my abs are back and like my pants are falling off it's that big of a difference from getting rid of this. It's possible that...

Grace: You got rid of that after the RS.

Dave: That was after the RS so now I'm questioning maybe I should go back and try a bunch more RS without blasto...

Grace: No, no, no, no you need Probiotic if you took metronidazole now you anileated all the good ones that you even had remaining.

Dave: Well I take a ton of soil based organisms I've used Prescript FX or other ones like that, but I'm done with taking more. I did try another brand that has those species I'm kind of afraid of the ones that are common like lactobacillus casei, Breve ones that are histamine formers I took those and I was like knocked out for like 3 days.

Grace: Yeah you're going to have to be careful right the balance is very important there are some people with [inaudible 00:30:25] problems did you have any other abnormalities like was the yeast off they can culture it on the TSA's so were they able to tell you anything.

Dave: You would expect for somebody that has a history of massive massive candida who has used fluconazole there is small amounts of Candida Krusei present.

Grace: Okay that's a problem; it's hard to get rid of. After metronidazole, you just made it grow 10 times faster.

Dave: Not necessarily keep in mind I'm on the Bulletproof diet I'm taking Caprylic acid and I'm taking nystatin at the same time so it's unlikely that it grew very much.

Grace: Well you know that actually alot fungi can use ketones as energy.

Dave: That's kind of interesting and that is not something that I knew although I know that in the gut that specifically brain octane gut bacteria hates not gut bacteria gut fungus hate Caprylic acid it tends...

Grace: When I had 4 plus yeast, nothing worked and when I went plutonic, it just didn't work. I think yeast is just really they've evolved just as long as we have and they've been here longer than us and our body temperatures make a big difference too. They have evolved ways to make our body temperatures go down by making us low thyroid and it's really hard to change that and even if your 98.6 you know yeast once it's established they have these thick microfilms. Even if you get the pH down with a lot of butyrate and what not they are just wiley, wiley clever little beasts.

Dave: You got rid of your own yeast and you lost 50 pounds and you healed your gut and you told me something that was really cool you used to be really sensitive to mold toxins and...

Grace: I'm not anymore.

Dave: Yeah and you're really sensitive to like Gluten and things like that and now you can like bath in pizza and your totally good right.

Grace: Well no, no, no I just don't get I don't, get I don't look 8 months pregnant I might be like 1 or 2 months, but it's a huge improvement.

Dave: You sensitivity went down but you still have sensitivity.

Grace: I have mercury still and I know I'd love to talk to you more about this, but yeah mercury is still a problem, but just a few years to see if I can get it out slowly I mean gradually so I'm okay living with what I have now. If I don't sleep enough or talk too hard I have gut issues a few days afterwards it's so hard to get back to norm, but in general, yeah I had good gut healing with using the right Probiotic. Getting rid of parasites like you I had the [inaudible 00:32:40] like parasite it's Wilson parasitic some pathogenic bacterial overgrowth the morganella morganiiem it's almost like admitting like a big old STD or something which I never had.

You have parasites, but they so common and these are the failures for resistance starch often because I'm sure if I tried resistance starch earlier, I would have had problems. Because I got bloated just eating celery, but once I was able to shift the populations in my gut I do not follow a gas diet, but I did use the symmetric um [inaudible 00:33:14] that they recommend I highly think that is helpful for people who can tolerate it without too much [inaudible 00:33:19].

Dave: It's funny because you talk about the GAPS Diet I was over at Donna Gates house and Donna wrote the "Body Ecology Diet" which is basically the GAP's Diet predecessor and Donna's become a good friend and she works with Autistic kids. She's just such an amazing fountain of knowledge and we just love geeking out on stuff like that, but I tried a fermented thing there and I'm one of those people where I know most fermented foods have histamine in them and I'm relatively sensitive to it. She could like see it she's like ooh that one didn't work well for you even though like the stuff she makes like it totally works on Autistic kids all the time. I'm used to being the corner case, but it's helpful because when you're the corner case you like become aware of these little tweaks that work for other people even though they're not as knocked down. It's still things that are like small road blocks in the path to just performing better, but okay so you were able to tolerate the stuff, but what were the specific steps so that you got rid of your parasite and then you took some Probiotic. I've taken like pig whip worm I've taken I don't know 50,000 dollars' worth of parasites over the last worth of parasites worth of Probiotic which could be parasites depending on if they're the wrong ones, but I've had a lot of them over the years and I know the ones that work for most people.

That's why I use the soil-based organisms primarily what are the ones that you like the ones that you've seen the most results with the ones that people listening to this who have gut problems might want to switch?

Grace: Oh there's a whole bunch ideally playing in dirt is the best healthy organic healthy dirt, but like the [inaudible 00:34:51] actually the one the big kick ass Probiotic because it's [inaudible 00:34:56].

Dave: I take that one.

Grace: Then the other one if you have read my blog is um the Clostridium based ones. It's like GCBC good cally by county we need the clostridia to fight bad clostridia.

Dave: I use to take that for years the strain from Japan that you had to order through Canada.

Grace: Oh yeah I use to see that that's how I got into it's like.

Dave: I never I gave up on it after a while, but it worked for you I think I took it for like a year or two.

Grace: I had to get rid of my parasites before these work.

Dave: Now that I've gotten off all of these Flaygl drugs, I guess I'll take a bunch, more a bunch more other types of exotic Probiotic and maybe start eating more of this resistance starch and see what happens. Again I would love to see it just magically work I'm a little skeptical at this point I think everyone who is on a low carb diet might consider this I don't believe in an extensive low carb diet for long periods of time it wrecks you. I did it for 3 months and actually got much worse on a variety of things because I did one serving of vegetables a day I was trying to do the Eskimo diet and you know only sub-exist on mostly fat and a little bit of meat.

It just wreck my sleep and it caused headaches and it was just a miserable time and I did not benefit from that in fact I got food allergies from that food allergies I never had before. That totally went wrong it was just an experiment to see what would happen if you tried to live like an Eskimo I did not predict that I would get these nasty food allergies. I am turning those around, but all right, your take as get rid of parasites take resistant starch and a whole big handful of Probiotic. Do it for a while and get rid of your mercury and like you're saying it sounds like you've been to the institute for functional medicine or something, but is that kind of the recipe you're talking about.

Grace: Oh, I mean I actually did certification with IFM...

Dave: I love IFM I'm not saying bad things there like I'm a fan of IFM, but you're starting to be like okay the recipe to fixing your gut is parasites metals, yeast, Probiotic and resistant starch and probably some other things like don't eat industrial animals and eat like healthy foods and things like that.

Grace: Right, right going back to our roots.

Dave: Okay so then are you a low carb, not a low carb advocate, or a Paleo advocate or ...

Grace: [Inaudible 00:37:11] I broke my adrenals so I can't be [inaudible 00:37:14].

Dave: You don't do [inaudible 00:37:16] even intermittingly.

Grace: I can't I started you have to peel me off the wall I get very I don't feel well. It takes me a few days to get over it, but after I heal my gut, I've been able to resume some of my little track one training. You know I can do a 2 hour work outs again no problem, but if I overdo it then I'm [inaudible 00:37:37] I have to be I have to just make sure that I don't overdo things.

Dave: [Inaudible 00:37:43] have you ever played around with taking cortisol like extra cortisol in order to deal with that.

Grace: One time I had that was part of my protocol, but I think it made my gut worse because you know cortisol just like whether it's from adrenal stress or from hydrocortisone or over the counter adrenal support [inaudible 00:38:01]. Right we tell people when they take steroids you know try to take Probiotic or take it with food don't because it breaks the gut.

Dave: Your concern is even like physiological amount, 2 ½ mg or 5 mg would have problems with what got preamble.

Grace: I don't know it just has on person yeah it's a steroid and it lowers PG it's also even like potentially like Motrin or Ibuprofen initially [inaudible 00:38:32], but over time you're preventing the healing of glands system you have to have to feel [inaudible 00:38:37] as well as pulsations. Some people like the elderly they have

these non-they have no pain and they have these huge ulcers because there on the NSAID for arthritis or you know they don't feel pain and then their ulcer is just getting bigger and bigger [inaudible 00:38:51].

Dave: I've seen stories of prednisone and that, but I haven't seen anything about low dose of straight like cortisone and that, but it's an interesting idea there and it's cool because your background is pharmacology and plant biology so you have a different point of view on a lot of the stuff, which I really appreciate. I'm not saying that I know that either one of us is right or wrong and I'm not even sure in some of these that we you can say we agree or disagree like were in the similar camps, but there is micro differences there.

Grace: Micro yeah micro.

Dave: What are some of the risks?

Grace: If you're calling me a bitch, it's true I totally am.

Dave: I haven't called anyone bitch since I've done my 40 years of Zen training like I truly don't think about that and if I do it's usually a compliment so. What I do like thought is that especially on your blog like your you throw down the Science and your pretty much like hey this is the way it is and I like that Richard does the same thing so you guys are both ones to stand up for what you think about. Now what are some of the potential risks or down sides of just taking like a cup of resistance starch and just make a raw potato flour smoothie in the morning choke it down rinse it down with some bulletproof coffee and go about your business like what's going to happen.

Grace: Well first, of the coffees hot I love the stuff taste ...

Dave: Okay fine you don't rinse it down with coffee ...

Grace: You got to be careful I mean...

Dave: I just drink that in the morning, but okay let say I just have this...

Grace: My personal gut healing protocol...

Dave: This cold nasty smoothie yeah.

Grace: Okay I know you really [inaudible 00:40:24] well my original little 7 seven steps you know for ultimate good health had cilium in it, but you know with cilium you know I actual knocked it off I don't really like it helps ...

Dave: I don't either.

Grace: You have to be careful because an ischemic GI block obstruction that requires surgery and people can die so I actually took it out I just don't like it, but everything has a risk preventative you just have to weigh it every person's different and unique it really have to be weigh. Like all fiber whether it's inulin, foss, and you know which is level EPGS for [inaudible 00:41:00] sensitivity or weight loss or any kind of fiber we've got to be careful. Because whatever the pre-existing microbyoda is you could have great results or you could be flaring arthritis and [inaudible 00:41:13] issues or could be driving like this huge amount of cecum fermentation and your body isn't going to like it and it's going to be uncomfortable.

Some people have reported little cecum pains or you have to perceive I like start low go slow and just see how it goes you know first sign of any problem you know cut back off and let adjustments happen there's an evolution in the gut. The gut is huge it is a huge amount of real estate like let it's a Abdullah it's a freaking island like you're at Vancouver Island.

Dave: Mm-hmm (Affirmative) I'm having a hard time getting actionable stuff so I might have bad stuff in my gut one of the guys that did the original research with Richard about this and I apologize I'm not remembering his name as one of his followers. Found this like iceberg kind of algae or not algae just an iceberg kind of bacteria in his gut he's like oh look I got my biome back. I have these weird things in there, but I'm eating tons of resistant starch I'm like what are the by-products of that specific bacteria. Since no one knows what's in their gut, and everyone eats different stuff every day that changes what's in their gut and specifically I know that micotoxins affect bio toxin and biofilm formations. You get higher lipopolysaccharide of whatever in your gut how in the heck would I know whether I should have a potato flour smoothie in the morning or whether I should like completely not do that.

Grace: Okay all right let me make first 2 corrections that's Timothy Steele he had the glacier bug...

Dave: Thank you.

Grace: That's similar to actually Japanese it's if you eat seaweed you're going to eat seaweed bacteria right seaweed bacteria no how to break down seaweed. You and I we don't have poorstanaces we don't have you know cellulases and blah, blah, blah we don't have these enzymes in our core microbial in our gut we don't have enzymes to break down seaweed usually, but the Japanese they do they found out that the gut microbial harbored all these enzymes to break down seaweed. We are what we eat based on the bacteria that we eat so perhaps in where the glacier bugs helped break down some of the vegetables I don't know that are around there. That actually could be good or bad I don't know, but looking at the kind of Taxonomy of the bugs, he had in there. Actually very favorable for instance James Adams he did the study actually, but they cultured the Autism guts and they found like a certain profile, fingerprint of you know when you do studies like this or am gut or even better is the Genova Diagnostics because they use the 16SR technology. You can get a fingerprint about what's going on and James Adams found there were low levels of valerianella and the strain called [coccolochyus 00:44:00]. Actually, for Tim's guts I was breaking it down, he had high levels of it, and he has as far as I could tell you know superficially he doesn't have signs of Autism on spectrum or anything. Unlike [inaudible 00:44:13].

Dave: It kind of runs in the community doesn't it.

Grace: I think it as a gift it's a gift, but it is hard sometimes and then the second question was actually on the blog I don't believe anywhere does it probably like advise to use an enema [inaudible 00:44:30] use the potato starch, starch is the one that's the raw has the high RS not the flour. No one [inaudible 00:44:36] flour is just going to raise blood sugars if that's your intent that's great, but actually in some medical terms that they...

Dave: Hold on though sweet potato starch is a highly processed starch that breaks down to glucose quickly.

Grace: No, no starch when you eat it raw doesn't break down to sugar.

Dave: Potato starch is already cooked right.

Grace: No, no, no it's raw.

Dave: Oh interesting.

Grace: My kids made it my oldest daughter she actually did a little experiment they made biodegradable plastic ...

Dave: Oh, cool.

Grace: They just did different tapioca and potato they actually made some didn't turn out to well. Things that they [inaudible 00:45:13] YouTube and all that, but it's highly refined it's highly refined, but it serves the purpose a lot of Probiotic will package with potato starch it's totally GMP [inaudible 00:45:25] it's really good for us. It's fine unless you have a [inaudible 00:45:28] I do believe certain people can have various issues, but then again it's probably based more on small intestinal intolerances and what's going on there.

Dave: Cool interesting you and I had talked off line about the concern that you might have when you dry potatoes, potatoes are one of the multies crops, and you do get things like apitoxin and ochratoxin and zearalenone. Just this long thing in fact potatoes are one of the riskier crops to store because of this problem as well as some of the other enzymes and metabolites that form in the potatoes skin. There are other reasons to consider not eating potatoes as like a regular part of your diet unless you don't have problems with the lectins and their properly stored and all that. I just at my own expense after you and I talked I ran a test of a common brand of potato flour against not the most incident panel I use because that's really pricey but against a relatively sensitive panel and it came up with flying colors there were no multi-toxins at all in this starch specifically not.

Grace: Right for all the starches they have to test if there's a spec they usually they have to have a certain level.

Dave: Not in the U.S. for most of them, there isn't a spec like that, it's incredibly simple in fact, China has better levels in fact China depending on this specific crop, but for many crops China has more controls in place then the U.S. does. When it comes to multi-toxins it's kind of amazing you wouldn't expect that, but compared to Europe, Singapore, a lot of countries in South America the U.S. just doesn't do it. There's a reason sometimes that the lower quality crops end up here somehow.

Grace: Ah scary. Did you check organic versus the popular brand that's kind of ...

Dave: This was the popular brand I did not check an organic one and it's weird because often times organic can have more of these toxins ...

Grace: Yeah they can have more right organic vegetables there could be parasites more just because they don't have those funky [inaudible 00:47:33].

Dave: Exactly and so I'm a fan of eating organic I recommend it, but there are risks especially for things that are stored improperly that are organic. Okay let's say someone is okay I'm intrigued at this idea that maybe this starch is good for me or some types of starch are good for me. They could go out there and get some raw plantain flour they get some potato starch not flour and just take it cold and just like swallow it how many times a day how much should they take and what should happen.

Grace: I think a good starting low dose for most people is like 1 tablespoon.

Dave: Okay when.

Grace: Depending on the certification, there is 8 to 12 grams of fiber [inaudible 00:48:16] just in starch fiber and they could take it either morning or night I prefer daytime in case there's adverse effects they can monitor it rather than sleep on it. I have seen very few adverse effects, but if there is bloating or gas or very rarely rash or issues just like cilium actually with cilium there is like a 10-20% rash or adverse effect for people within asthma. It's better to like a daytime just like medications as well or a new food that someone is introducing it's probably better to look at in the daytime. One tablespoon you know not very much and it's a good litmus test most people try it for a couple days it's just like adding a new supplement you add it and watch and monitor.

Dave: You would do it in the morning and would you do it with other foods or just all by itself or how would you go about it.

Grace: Oh well since it's a food yeah either way and you could do it with or without Probiotics that's I'm really not as you know the SPO Probiotic is soy base you're not going to bloom and open until they hit like where there sitting. The small intestines or the colon it doesn't matter of the timing as much.

Dave: I recommend when people are trying this that they take Probiotics with it just so there at the same place and they got it at the same time even though I did not have the results I'd hope for from this. I'm actually willing to give it a try again and it was actually Richard that suggested using the potato starch rectally. And it was interesting and I didn't get a rash that way it totally I don't actually on the Bulletproof Diet I don't get gas since we're talking about poop and what not.

Grace: Oh yes I am the gut wise come and tell me all your poop stories I'd like to hear it.

Dave: This has been like the day of all the Podcasts I've worked on today have been like around anything that's inside you anything covered by your underwear were going to be talking about that. It's funny because the gas is an issue, but I don't normally have gas at all, but if I go into a moldy building and hangout there for a while 2 days later my gut is destroyed. It sheds it's lining and I get like really bad gas and I have that going on and this happens to me like twice a year now because when I go into places like that I leave and then I don't get the effects. I use this stuff and it just happened to be at that time that I used the rectal potato starch and the problem went away within 10 minutes and it was gone it was permanently gone I was kind of blown away so I know that it's a good idea to feed the bacteria.

Grace: You mean the environmental problem.

Dave: The bad gas that had come about like the stuff...

Grace: Oh gas yeah.

Dave: When you like never have gas it's...

Grace: I mean now that you brought it up rectally they have been butyrate, as you know there's been butyrate enema's and suppositories there actually has been potato starch or resistance starch rectally used suppositories for some medical use. After, surgery for certain rectal surgeries to see if the tail end works or not they insert the starch actually and there is some protection a little bit. It's not totally unheard of it's just not the normal way, but it's interesting that you had that result I think it says something. Maybe the low end of your gut is healthy than the front-end small intestines that's my theory.

Dave: It's entirely possible and I am inviting Richard on of course to talk about resistance starch as well because he's like the expert there and I'm a fan so I'm really looking to get to the bottom of this so to speak. Understand A why didn't it work for me and B there's something to it I just you know I'm not sure what's going on.

Grace: Yeah I can pin down so many wonderful results besides the one that posted on my blog or in my comments I [inaudible 00:52:07] truly fast autoimmunity disorders reversed in 4 to 6 weeks people have autoantibody results their shocked they can't believe it and then clients and people at Free the Animal. We have higher testosterone reported we don't have a number yet, but these are just objective findings subjective findings from the commenters. It's clearly, for me it helped my adrenal so anywhere that someone is helping their adrenals now you got like an [inaudible 00:52:38] source of testosterone outside of your gonads, which is always good.

Dave: Yeah no kidding who needs gonads that way.

Grace: No their so important because we don't need to be Unix and a lot of time were Unix because we have this huge stress because the gut is just so inflamed and the gut as you know is huge it's like the size of Vancouver Island relative to the rest of our body . We have to nurture it or take care of it make sure the commensals are there and that's the only problem I have with a very low carb diets. Because one Atkins study show by Duncan it all in 2007 same thing, which is zero carb the good butyrate producers went nowhere they're gone almost like an antibiotic and butyrate production went straight down to a $\frac{1}{4}$ a $\frac{1}{5}$ of production of maintenance diet. These are very important species we need them and they will crowd out yeast they will crowd out [capajens 00:53:28]. They do their job to keep the small intestinal lining and epithelia type junctions tight. When they're not, there we have a lot of problems, and also what they do is they breakdown cross feeders that feed on like bifida ...

Dave: Interesting.

Grace: We can eat all the inulin we want, but some of them they're fast degradator for resistance starch and then they are very good at pushing out propelling out pathogens like your parasite and my parasite.

Dave: Well say my former parasite I killed that...

Grace: Well then, now you took metronidazole, and now you probably you know could use some that opportunity for the opportunistic pathogens are going to come back.

Dave: Well at the same time as Probiotic and all is well right it feels like that hasn't happened, but we'll see.

Grace: Well, just study it the other way. If you took the Probiotic that's a better protection, but we still need bifida and the other ones they have to be fed they need resistance starch and all of those.

Dave: Well I'm certainly not on a zero starch diet you know I recommend that people cycle on and off and you know have some starch have and evening. I've been conscientious about feeding them, but at the same time you don't want to feed yeast and one of the things that's worked for years on the Bulletproof diet is don't be in ketosis for long periods of time. That seems to be disastrous and don't be out of ketosis for long periods of time if you want your brain to work and lately the addition of using the brain octane oil instead of just coconut oil it just provides more ketones.

You get more CO-enzyme MA and more bid Hydroxyl butyrate so even in the presents of rice I poured brain octane on my sushi. I'm getting the cold rice I'm getting the resistance starch, but I'm also getting the ketones at the same time and that's been kind of a glorious thing especially when I travel on business. You know I might eat more rice when I'm traveling just because of the availability of food, but it tends to be in a way where I still have ketones present so I can get the mental performance I'm looking for.

Grace: That's interesting so when you eat the rice do you flare candida or any issues.

Dave: Not at all.

Grace: Oh okay then you should do okay that means you are getting a few rems of RS and other fiber and maybe it's the dosing issue then.

Dave: It could be a dosing issue it was kind of a mystery...

Grace: Starting low going slow is often the best.

Dave: If anyone was going to get a placebo, effect from resistant starches was me I was oh this is great like I how cool is that you know everything is going to be good. It totally didn't work so I'm going to have Richard on assuming he's willing I'm sure he would he's a cool guy and he's totally reasonable about discussing. We'll see what his comments are because I talked with Mark Sisson about it as well and I feel like there is some meat on the bone here so to speak, but I'm very concerned about whether the stuff that grows is the stuff you want. You know certainly in the lower gut we see that, but aren't you going to feed yeast that's a big question here as well. If you take a bunch of resistant starch and you have candida what's going to happen.

Grace: Well since you tolerate the sushi rice okay, it won't cause a problem, but then...

Dave: I do but for the average person with candida and I also don't have candida albicans I have like a slow growing slow moving species of candida that's mostly been knocked down. Like Chris said much less [inaudible 00:56:50] than albicans so it's like it's there, but it's not the big issue that albicans used to be for me I used to be extremely yeasty.

Grace: Yeah really [inaudible 00:57:00] it's interesting we really need to know what's in the gut I mean some people actually don't have e-coli. For instance, I had chronic fatigue syndrome before I had oodles of microbial proteins probably crossing over into my brain and out numbering other natural proteins. Whereas controls don't have this all and at the time if I had probably taken resistance starch I probably would have had issues so it is very pondient um to know what's in the gut and then do appropriate seeding feeding and weeding. Now you've done the weeding and it still depends on what's in your small intestines.

Hopefully, you haven't grown you know pathogens that would love to feed on RS like is highly implicated in auto arthritis issues. We've seen a couple individuals they have flares of their autoimmune arthritis and at one time if they can tolerate some RS their pushing out pathogens they can get really good results with that, but at the same time they're going to have a little flare probably. Again you have to know what's in the small intestines it's very helpful. If the weeding can happen prior to massive you know prebiotic dosing it helps, but again it depends on the person what's the point of risking benefit some people can feel benefit that I've seen like a lot of my clients, but again it just depends on the person.

Dave: That kind of the core of bio-hacking their where you can look at what works for a lot of people and you can try it out. You can see did it work for me yes or no and that's at end of day that's kind of, what matters. If you're tracking your data and your tracking your results and you give it a try it's the willingness to experiment and then the willingness to look at the results objectively versus what you want them to be. In my case I certainly wanted the RS resistance starch results for me to be oh you know cool like look you have gluten it doesn't matter anymore all though I honestly don't think that there is good evidence that anyone should be eating gluten especially on a regular basis.

Aside from that, I would just like to be able to know that I'm less sensitive to this stuff that I've been sensitive to for essentially my whole life so let's turn that down. There's another question though that I'd like to ask you because were coming up on the end of the interview and it's a question that every guest answers and it's what are your top 3 recommendations for people who want to perform better just in all walks of life. This is just about resistance starch or about your work, but just your whole life if you have 3 pieces of advice you could share what are they.

Grace: Oh, wow um this year for me I'm focusing on actually dreaming big and um ...

Dave: Love it.

Grace: Yeah two laughing more I think this synchronizes our gut and you do that great Dave so I think...

Dave: Thanks.

Grace: It's a great gut buster I mean booster. Third, wow an all-time favorite I think it's important to Zen out a lot of us don't, but that's one of my challenges, actually yeah, I started some yoga this

Dave: Cool.

Grace: Since I've been here in China yeah-huge life change for me that's it.

Dave: Awesome.

Grace: Thanks for having me on.



Dave: Grace it's always a pleasure next time your back in the Bay area on one of your trips let me know and I will if I'm in the Bay area as well at the same time. I would love to sit down with you at Birk's and have another steak and see if Richard and anyone else from the community down there maybe we can get Gary Taubes to come down from Berkley or Chris Kresser or Dr. Sara Gottfried or someone. These are all people I know and respect so we'll have a good old fashion bio-hacker you know eat a lot of meat and maybe drink a lot of potato starch kind of dinner.

Grace: I'll leave the potato starch at home and just go for the red wine.

Dave: I like it have an awesome evening.

Grace: Thank you too.

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