

Paleo Solution - 276

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Hi folks, Robb Wolf here, another edition of the Paleo Solution Podcast, very excited today. We have one of our all time most beloved guest. She is the author of the phenomenal book Move Your DNA, Katy Bowman, biomechanist, farmer, mom, and changer of the world and expert mover. Katy, how are you doing?

Katy Bowman: I'm good. Farmer, that's the first that's ever been in my bio before.

Robb Wolf: Well, it's recently added that to my bio too so...

Katy Bowman: And relative to the amount of work, it really should be first.

Robb Wolf: Right.

Katy Bowman: Like I feel like farmer, mother, biomechanist is probably more the appropriate in order there.

Robb Wolf: Right, right, awesome. So we were just talking about your – now remind me, how old are your kids again?

Katy Bowman: Two and a half and just 4.

Robb Wolf: Two and a half and 4, okay. So we have a 3-year-old and an 11-month-old, so we're kind of in the same...

Katy Bowman: Yeah, yeah.

Robb Wolf: Same deal. Awesome. So what is new? You've been on the road a lot I've noticed.

Katy Bowman: Yeah, Europe. That was on the cobblestones, so the cobblestone roads a lot and took a little bit of vacation to Iceland in between doing some work in Europe and then trying to get back last year, I made the big mistake of traveling, leaving where I live, which is the most gorgeous in the summer time and doing like a big Move Your DNA book tour during the summer and I was like, we'll never do that again. Let's do it during the winter.

Robb Wolf: Right.

Katy Bowman: Where we want to live and so we timed it so that this last big kind of hoorah for the summer and did May 31st. So now I'm home and I don't have to go anywhere for a few months and I'm looking forward to it.

Robb Wolf: Awesome. What did you think of Iceland? I've always been intrigued. I have never been there.

Katy Bowman: Oh, it's amazing. It's such a primal place because it is in the process of forming that it's very much like being a flea on the back of a dog. It's like it's busy doing what it's doing and you're just hoping that a big giant leg doesn't come and scratch you off while you're there.

So it's mostly lava and nothing grows there. So the Icelandic diet, I bought this great little book about – it's just this cute little tiny book and I learned so much about Iceland. I gleaned so much about what they eat so like their basic diet is fermented meats and skyr, which is like a kind of low fat yogurt and seaweed. They didn't have salts. They didn't have grains.

It used to be forested like the book of the planet, but it was rapidly deforested when people first got there because of heat. They used all the wood and then so I think grains grew there once upon a time, but then once the wood was gone, then the whole system changed and then it was just mostly meat and seaweed. They use the seaweed for a lot of their vitamins and fish. They started fishing and dehydrated fish and it's very limited. We had a traditional breakfast of dehydrated fish and coffee with seaweed in it.

Robb Wolf: Wow.

Katy Bowman: And that's it, like there are no fruits or vegetables. So it's very interesting, that plus I mean like volcanoes and...

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Robb Wolf: Uh-hum.

Katy Bowman: We hiked right up to...

Robb Wolf: Hot springs.

Katy Bowman: Yes, hot springs and we hiked right up to where – we hiked up on the volcano to where the ice, the snow pack was turning into a river. Everything is drinkable there. All the water is drinkable and I was like wow, there were little kids, like this is insane right now. We're on a volcano watching snow turn into the drinking supply, like this is it. School is done for the year kids, like you don't need. There is nothing else you need to do.

Robb Wolf: Hydro cycle is done, yup.

Katy Bowman: Yeah, yeah, it was cool.

Robb Wolf: That is cool. I was listening to kind of a politics econ podcast recently and they had an Icelandic economist and banking guy on there and it was really interesting. In the Icelandic language, the term for windfall, like if you're playing monopoly and it's like, you've got a windfall of \$200 or whatever, but the analogous term in Icelandic is whale washes up on the beach.

Katy Bowman: Right because...

Robb Wolf: Food. Big food.

Katy Bowman: Yeah, I mean like the mother load right there.

Robb Wolf: Right, right.

Katy Bowman: Mother load.

Robb Wolf: Yeah. So that was so fascinating. Well, I saw that you guys were in Iceland and that's some place that I've wanted to check out. So maybe will give that a shot sometime soon.

Katy Bowman: Well and the plug for Iceland Air. Iceland Air is this airline that's started up I think just to improve their tourism and you can go to Europe via Iceland...

Robb Wolf: Uh-hum.

Katy Bowman: And you can get off and stay in Iceland for 4 days at no charge.

Robb Wolf: Really?

Katy Bowman: Yes so like that's what we do. It's like we just use Iceland as a way to breakup from Seattle to Iceland is only 7 hours. So it's an evening flight. We get on it 4, kids are asleep by 6:30, we watch a couple of movies, we land at 11:30 hour time. It's not a strenuous hump at all. You just get over there, take a few days and there is the big tourism geothermal pool, but movement is not easy to come by there because of the extreme cold weather.

So the government has taken a lot of their hot springs water and made swimming pools, warm swimming pools all over the country and they're like 6 or 8 bucks to go in and you can stay for hours and they're like water parks. They have water slides with warm water and so everyone is just swimming year round and so we went swimming for hours every day because you're warm from the neck down, just dunk your head under and it was really awesome. It was just total – it's just very different than anything you've experienced or anything I've experienced.

Robb Wolf: Wow, very cool and it seemed like going in the summer would be kind of cool because you get some long days maybe some aurora borealis and all that stuff so...

Katy Bowman: Yeah.

Robb Wolf: Super cool.

Katy Bowman: Yeah.

Robb Wolf: Well today, we have something a little different. We have a Q and A session because I had thrown out the possibility of doing a book club because Move Your DNA which is one of the most powerful transformative books that I've read in probably the last 10 years and is good in ideas that was in theory. It was horrific even both my schedule and your schedule so in lieu of that, we kicked around the idea of doing some Q and A from some folks and so, do you want to jump in on some questions?

Katy Bowman: Yeah, let's do that.

Robb Wolf: Okay. So the first one title is Best Footwear for Hard Surfaces. Arthur says I just heard Ben Greenfield mentioning on another podcast a standing mat called Kybounder, which was developed to strengthen the foot muscles. The same company also sells shoes and they provide proper cushioning while our feet can feel the surface. Any thoughts on that product or alternatives?

Katy Bowman: Well, I guess I'll put on my Move Your DNA hat. So what we're going for now in terms of like rethinking movement is how many different movement nutrients can I gather throughout the day so flat and level. I'm thinking about people who is in a standing mat, people who are going from sitting may be traditional workstations to standing workstations, standing all day on something hard kind of sucks for your feet. So there are these mats and there is a bunch of different mats coming out and they're called anti-fatigue mats. This one, I don't know if it's a Kybounder, Kybounder?

Robb Wolf: Kybounder.

Katy Bowman: K-Y bounder. If you guys want to look it up. It's just like a dense foam mat. So when you step on it, you kind of sink into it and they use it in PT or corrective exercise facilities where you're trying to create a little bit of instability. So when you step on it, it kind of – it's very malleable, it deforms and if you are moving on it, if you are stepping, then you would - it would massage or work your feet. So I would say that that's one type of surface. You kind sink into it So it's kind of like standing in mud, right. You get into mud and you just sink down. [sound]. That was a sound effect that I just made there. I do that a lot.

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But then I'm thinking about in terms of alternatives and alternative wouldn't necessarily be in lieu of. It could be like I like the new topo mat. So the top mat, which are not in shipping yet, they are these mats that have a contour to them. So as you are standing there working, you could position your feet differently so that they're slightly uphill or slightly downhill or you can have one foot uphill and the other foot pointing downhills. You can go look them online. They have mounds on them. So in that way, you're introducing different variables then the Ky Mat. The Ky Mat is like squishy and malleable. The Topo Mat is a little bit more firm, but it would duplicate maybe the loads of standing on or walking over depending on how much movement you're doing at your desk over varied terrain with different pitches in it.

So in the end, I don't know if the goal is to find the perfect product or that if any one product is going to replace the movement. But you could certainly cycle through maybe 2 or 3 different things even if you just make it on yourself like folding a yoga mat or 4 or 5 times and just stand and put your heels down on the ground and your toes up on the mat and then switch it. So your heels are up on the mat and the toes down and vice versa. You're just moving around the whole time. Movement is the key. So any product that allow you to vary your movement would be beneficial, would be my final like thought on the matter I guess.

Robb Wolf: I like it. I like that a lot.

Katy Bowman: Alright.

Robb Wolf: I have not had a chance to play with those, but I have been folding up the mat, the yoga mat and putting that. I have a – I'm actually standing on a treadmill desk right now. In phone calls, I can use that. If the weather is good, I just go outside and hope that my cell reception is up to snuff, but typing while using a treadmill desk, I'm very, very prone to motion sickness and I actually get motion sick typing while walking. I'm such a loser. So I've tried to mixed that up, but even to your point, that's a very kind of monostructural type of movement palate to rough on, possibly better than just sitting or just standing, but would lend itself against more variety in that clearly.

Katy Bowman: Yeah and then to always think about, this is like to go back to our original conversation on Vibrams, like the first time I was on your show. The benefit is not in the tool. The benefit is in how you use it. So if you have a mat and then you just stand still on the mat, there is not really a lot of benefit to your musculoskeletal system. If you're moving yourself over the mat, that's where the benefit comes from.

So I think that a lot of times, these products are created using the arguments of as see as you step on it, it does x, but they're only considering like that you stepped on it. Now, that benefit was in the first 2 seconds that you used it. If you just continue to stand there being still, that benefit does not continue to cycle. So movement is the key and I would say any tool in that way is going to be beneficial and then a whole variety of tools would be even more beneficial.

Robb Wolf: So Katy, you're saying the tools we need to use them effectively and continue to do something. They just don't do everything for us, right?

Katy Bowman: It's like I've been sleeping on Move Your DNA under my pillow and it's fantastic, it's great, it's very – above the angle of my neck and want it, Yeah, you got to use your tools.

Robb Wolf: Right, right, awesome. Okay. Let's see here, jumping in to recurring lumbar herniated disks. Joe says I have problems with recurring lumbar herniated disks. What movement should I be working on to improve this? Is there a simple answer or does it require an in person assessment? I have some guesses on that, but we'll go to the expert.

Katy Bowman: Yeah, it's not a simple answer, right. So it's not a simple answer or it could be. The simple answer could be that there is a way of moving, a variety of movements, plugging some micro nutrients in the form of corrective exercises back into what you're doing. But to be able to give someone a corrective exercise via a podcast or even via a blog post or even if I say something like, Joe you should be doing the spinal twist because your herniated disks and herniated disks is a category. Everything is a category. Herniated disk is a category. Your corrective exercises for your herniated disks is going to differ than someone else's because a herniation isn't always in the same direction.

So you're using corrective exercise to reform your structure and so in that way, it requires an in person. I don't even know if in person is the right word. It requires a specific exercise prescription if you will for you in your particular movement habits because if I listed the exercises, there is a very high chance that the way you would perform the corrective exercises are using the ranges of motion that you use all of the time that led to your injury.

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So what I like in in-person assessments is that it's more like an in person personalized teaching lesson for you. I think that you can get that ability to understand your own structure, not necessarily in person, but before

you learn the corrective exercises, I would say the first step is to learn how to better assess how you are moving. Meaning, you have to be able to put yourself on the grid and so if I say, okay, you're going to do spinal twist, but you should also be able to hang so that you're trunk muscles have the ability to stabilize your lower part of the body relative to the upper part of the body. That you first see how you're doing those exercises in your most natural way, which would be a way that would probably exacerbate your injury and then could you work with parameters that would allow you to perform what would still fit into the same category of those exercises, but in a way that coaxed your hernia back or would changes the pressure system so that hernia wasn't continue to be there.

So it's a complicated answer. Do things that you can learn how to move without feeling like you have to go somewhere to be, spend a lot of money to travel or whatever. But you could certainly visit your local corrective exercise or physiospecialist, someone who really understands movement assessment to see where some of the holes are and then they can give your some exercises. But if the big question is are there exercises to fix it, I think that yes, there are. And then also are you correcting the broader habits that led to it, right, like are your lumbar disk herniation is not necessarily about corrective exercises that your didn't do as much as the whole way that you move that led to that – set of physics that led to that.

Robb Wolf: The macro nutrient movements that are really causing the big input there.

Katy Bowman: Yeah. I do recommend down in the macro and micro. I think of like macro in general, like how much you walked, do you squat, do you carry things, do you use your arms and then also how much time do you spend sitting in a chair, how much time do you spend on the computer, how much time do you spend indoor. Like big macro concepts where the loads are kind of clumped together and then from there, the micro nutrients are when you do a spinal twist, does your left rib shear up farther than your right so that you end up you're not actually rotating your spine, you're pushing on your disks on a different way so the rest of the show, that's how I refer to those terms.

Robb Wolf: Nice, nice. Now, how many – do you have folks through the restorative exercise institute, is there a way to track practitioners down through that?

Katy Bowman: Yeah, yeah. You could actually go just to restorative exercise and find a practitioner. So yeah, that would be a good way of someone who can help you with that.

Robb Wolf: Fantastic, okay. Let's see here. Impact on biomechanics from wearing a backpack and I would slide in this also kid carrier although we have 3 different kid carrier options that we used would say again. So let's see here. Erick says, first off, I enjoy and learn a lot from your show, keep up the great work. It would be fantastic if you could discuss the impact on biomechanics and possible negative and positive consequences of moving a lot with a backpack, possibly touch on differences in wearing and not wearing a hip strap to take the load off the shoulders and the context of wearing a low profile zero drop-shoes. I find that I end up doing most of my walking with a backpack, but with the laptop and books on the way to class, carrying equipment on the way to work, carrying home groceries and on weekends and holidays hiking with tent and food, the pack might weigh anything from 5 to 20 kilos, might end up walking it 5 to 15 km a day, sometimes jogging a fair bit if the distance of speed is needed. Thanks Eric from Denmark.

Katy Bowman: Holy cow.

Robb Wolf: You're international.

Katy Bowman: Well, I know I'm international, but that was a long question.

Robb Wolf: Yes, yes.

Katy Bowman: Okay, I think the question is what does wearing a backpack do?

Robb Wolf: Right.

Katy Bowman: Right, okay.

Robb Wolf: And then also with sub question, pluses and minuses of using that hip belt to transfer load directly in to the hips.

Katy Bowman: Yes, well, okay. So again, so we've got, we have like on one hand, we have this idea of ergonomics, like that there is a best way to load the body and so a lot of times, questions will stem from that. Like am I wearing backpack too much, backpack with hiking boots or heeled shoe and what about the strap. Okay, so that perspective is coming from, like ergonomics is coming from this idea that there is an optimal way to do a

single thing over and over and over again. So you're trying to find the optimal way and to like mitigate damage.

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So if though we start a little bit farther back, where just doing one thing over and over and over again no matter how you do it is the problem, then it makes it difficult to answer that type of question. So I'm still going to answer the question, but just so everyone can kind of keep that in their mind.

So backpacks are awesome. Backpacks are a way to carry a heavy load without having to do it in your arms. It's like a hands free way of doing it. However, what it does is kind of keep the load to the same tissues over and over and over again. Where it would be more natural to kind of shift, shift when your arms are tired, like I carry my kids, when my arms are tired, I just changed the way that I carry them and in this way, I'm in a very organic relationship with whole body...

Robb Wolf: Structural fatigue...

Katy Bowman: Yes, a whole body use though too, whole body use and it allows me to be very creative and to be very reflexive in the way that I respond to fatigue. So I respond to fatigue in my left arm, I transfer to my right arm, which is also using one side of and using my abdominal core as a whole in one particular way or nutrient. And then when I switch arms, I'm getting a different way of using my core or nutrient that the symmetry doesn't have to be moment by moment.

Sometimes, symmetry is a use that can be over a day or over a lifetime that there is a broader idea of symmetry. And then so I throw my kid on my back and then I don't use my arms, then I put them on my shoulders, but either way, when you don't have the technology, you are much more likely, because you have to cycle through many different ways, but that being said, backpacks are rad.

Using a backpack, a single backpack affects your body and that it calls on the same limited way of using your body using your strap to change that a little bit. So there is nothing wrong with using a strap because it transfers the load to a different part of your body. You can also do – what I do sometimes is I will just wear my backpack on the front just as a way of transferring a different load. Because then eventually, you get adaptation, structural adaptations to the way that you always carry the weight and that adaptations aren't necessarily improvements. They're just mass distributions within your body that make what you have done

easier on you so that's it's more likely for you to continue that way of doing in the future.

So as far as, I don't know what else is the asking, again like, whether you jogging it or walking, if it's 5 kilos or 20 kilos, it doesn't really matter. Every single difference is a unique load. So sometimes, I carry my backpack just over one shoulder and then I'll put it on the other shoulder. So that would be the best way to use that technology. That would be a way to use that technology and also get what you're after, which is a more uniformed cellular distribution of load, same thing with baby carriers, right. You're cycling through 3 different kinds so it gives you different ways of using your body and also your child, right.

Robb Wolf: Exactly.

Katy Bowman: Your child, like that's really what I was more concerned with is like cast of sorts, right. All these things are casts where it's in unnatural limitation of your full spectrum of movement. So that goes off in hand in hand with the technology is that there are these visible and sometimes invisible limitations. So when you're cycling through different baby carriers or when that same baby carrier is being worn by a different person, those are all different loads to the person in the baby carrier. So if you're going to play with your technology, just it's pretty easy, change its position. With the backpack, you're kind of limited. I guess you could put it on your head sometimes, but it's just that. It's just realizing that there is not a uniform – there is no optimal repetitious holy grail.

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Robb Wolf: Right.

Katy Bowman: We're not – like searching for that is kind of missing the broader point.

Robb Wolf: Right.

Katy Bowman: I think, which is use your technology in as varied ways as possible.

Robb Wolf: And you know that's such an interesting concept in this, like if you get into the Matt Ridley, a rational optimist off like the way that we kind of succeed in the modern world is in specialization.

Katy Bowman: Uh-hum.

Robb Wolf: So you get really, really good doing these certain things and then you get a comparative advantage there and more and more of that becomes more technology based, but even that has movement implications. So

Ironically, you know for the development of a comparative advantage in the modern world, you need to specialize, but the specialization typically ends up limiting your movement pool, which has all kinds of potentially deleterious effects on your physical being, so that is some interesting stuff.

Katy Bowman:

Yeah. We're in a weird of time where movement is not really required for social achievements, but at the same time, it's still required for biological ones. So that's where we're playing right now like, I think that the land that we're kind of dwelling in, which is what exactly are the requirements. in the work that I'm doing right now, I'm really trying to flesh out this idea of a movement nutrient, a mechanical nutrient. Because we all grew up in a dietary culture where the idea of dietary nutrients were just part of our cultural fabric, right, it's part of your elementary school education.

You understand this idea that there are inputs that are necessary that have nothing really to do with the foods that you eat, like unfortunately, it's been so separated where there are these vitamins that you need and they don't really have to come in the context of food, like there is food over here. You need food, but you also need vitamins. Sometimes your nutrients don't line up to your diet so then you can supplement, but we don't have the same understanding of a mechanical nutrient. Meaning, I think everyone is on my same page when I say like you need certain vitamins or your biological process will fail, but we don't do the same for mechanical nutrients.

We have kind of like, well I've just adapted away from needing those because I have this technology. it's like I'm not so sure and it all goes down to the semantics and like baseline definitions of just because you have to put a technology, nutrient supplements pill into your mouth, it doesn't mean that you evolved past meeting the nutrient. So mechanically speaking, if there are these mechanical nutrients that are necessary, how do we get a culture that recognizes that there are some inputs because unfortunately, at least at this time, there is no easy supplementation of a mechanical nutrient. It's not a chemical compound, right. It's the reaction, that's a mechanotransduction is. The biochemical response to a chemical compound, which is really what a nutrient is, right, not what you put in your mouth, but what happens when you put it into your mouth.

Same thing with mechanical nutrient. The mechanical input is not the nutrient. It's the biochemical response to the mechanical nutrient and mechanical nutrients, which is just a term that I'm coining an idea that

I'm working towards. It's going to be a little bit more difficult to put that into a pill because if it's a squeeze or a squish or compression, like may be there are machines like there are already vibration machines. You're working towards trying to stimulate the body to secrete this biochemical process. So in that way, it's going to be really interesting. Of course, we'll probably be dead before...

Robb Wolf: Anybody figured it out, right.

Katy Bowman: Anyone figured it and he went like before, it's hey yeah, we need my vitamin textured walking today, like before that, there is that kind of language going on, but whatever.

Robb Wolf: Right. I've been calling that job security lately. It's frustrating on the one hand, but I'm like, it's job security.

Katy Bowman: I don't mind the frustration because if anything, I've always got farming.

Robb Wolf: Right, exactly.

Katy Bowman: There is always more to do.

Robb Wolf: Yeah, yeah. Okay, let's shift into squatting. Alice says, I'm incredibly envious of my flat footed squatting sister-in-law. She is of Chinese heritage and this position is her preferred resting pose. However, I try to squat for about 15 minutes every day and wonder how long it will take to coax my heels to the floor. Are there extra stretches I can do to minimize the time I spend on the balls of my feet? So thankful for everything you do. Thank you Katy.

Katy Bowman: Oh nice. Are there extra stretches you can do to minimize the time you spend on the balls of your feet? Well, the first exercise is stop spending any time on the ball of your foot. So if you're just standing there and your weight is on the ball of your foot, put your heel down. That's your first exercise.

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The second exercise is stop wearing positive heeled shoes, which are also putting you on the ball of your foot. So you're adapting again to what you do most frequently. So Achilles tendon or calve shorteners would be anything that plantar flexes the foot or flexes the knee. So how much time do you spend sitting in a bent knee position that like reducing that is an exercise towards helping you get your heels on the ground during a squat.

So what do we have, back your hips up. Backing your hips up is another way to help you keep your heels down. Those are things that – those are loads if you want to put that what I'm calling an exercise into this idea of a load, you need to be doing more frequently than you're not doing it.

So corrective exercise again is something that we're trying to mitigate the effects of doing something all day one way with doing something for 15 minutes. So it's very difficult to get your heels down in a squat because of the ample time you are spending not doing it. So squatting more frequently doesn't have to be for longer duration, like if you're sitting there for 15 minutes struggling to keep your heels down, your heels aren't coming down in that period of time. It could take years for your heels to come down, but that amount of time it takes for them to come down depends on how you're living your life all of the other time movement wise, how you're moving in your life all of the other times. So reduction in sitting, reduction in positive heeled shoes and then of course there are corrective exercises that help you support yourself in these other positions. Because one of the reasons we don't stand all day long or rest in a squatting position or use the floors because we really don't have the strength or the endurance to be able to do it.

So like anything that you're trying to improve your strength or your endurance before you do it a little bit at first and then you slowly do more and more because you're changing your mass distribution along the way. So the corrective exercises that would supplement these lifestyle changes that I'm talking about is movement lifestyle changes are in whole body barefoot. So I wrote a whole book on transitioning to minimal footwear, which I think it's got like 20 different specific exercises that will help you over time get your heels down because it helps you shift the mass distribution where you're able to use your body to support yourself instead of furniture and shoes.

Robb Wolf:

Nice, nice. Katy, I don't know if you follow coach Christopher Sommer at all. He is a gymnastics coach, developed gymnastics bodies, training methodology and they use weighted stretches in a pretty interesting way. I started incorporating some of that like a goblet squat where I hold the kettlebell, get down into a front squat position. Could you think about that as kind of like a dose response curve, like if you're loading those tissues in a kind of super physiological way because we have an external load that maybe we're going to goose some of that structural adaptation? Like I feel really good doing that and if I've done jujitsu one day and my hips are kind of creaky and my knees are kind of creaky, I'll do a general warm up and then I'll kind of hang out in a goblet squat, do some weighted lounging, but with the emphasis not on a muscular work,

but on mobility work. I really get a very nice response off that and I'm 43 years old, connective tissue, fascia is probably turning into fossilized remains at this point, but I get some mileage out of that. What are your thoughts on doing some kind of super physiological loading that way?

Katy Bowman: Well, I think that – it's complicated so I'll start with that. I think that there is a large benefit to doing things heavy. I don't know if heavy, I'm thinking of a kettlebell, it's heavier, it's an extra load to push you to help facilitate the load. I would have a question, have you noticed since doing it, like are you doing it to keep your heels down closer to the ground? Are you doing it specifically for that or are your heels already down or you're trying to change your joint range of motion like a number?

Robb Wolf: My heels are already down. I feel like my hips are a little bit more the buggar there, like my Achilles tendon range of movement seems to be pretty good, but it really seems to kind of loosen up my hips. It allows me to be in a good balance between extension and flexion in my low back, like I'm in a really nice really upright torso position. I can feel my spinal erectors firing. It seems to me I have a tendency for my psoas to kind of kick in versus like abdominal wall kicking in on some movements and it seems to just kind of make all that stuff right.

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Katy Bowman: Well, I think that with corrective exercise again, that varied input is the goal. Like what you're trying to do is you're trying to communicate, this is going to be like a poor way of saying it, but you're trying to give your body information about how you would like it to behave. Your body is always just kind of responding to how you would like it to behave. It's interpretation of how you want it to behave being the inputs that you are selecting for it to respond to, right. It's the environment – habitat is the big thing with movement.

So you've got these gentle stretches, right, because it's very easy and the reason I'm hesitating on like the kettlebell for someone trying to get their heels down is it's very easy to rupture your Achilles tendon and so putting on too heavy of a load could damage it, right. You can't really force your body to change, but at the same time, forces are the things that...

Robb Wolf: Facilitate change.

Katy Bowman: Initiate or facilitate the change, yes. So by forces, force is being something different than force. Force being you just wanted to go full Monty. It's like you were a coach potato as far as your Achilles tendons are concerned and you're going to go run a marathon. Like there is a natural progression of physiological adaptation and it's step wise.

But I also hesitate to be like just keep stretching your calves gently until your heels come down. It's like no, it doesn't take that. It requires you walking 5 miles in a shoe without a heel now so that your heel drop down to the floor underneath somewhere between 100 and 250 pounds. Like those are loads, like those are many loads distributed throughout the day and then you're not going to use your furniture and that you're going to squat down to and come back up off the ground.

So the muscular adaptation, which is then part of the constant signaling to the Achilles tendon, all of that is happening as well and maybe you do some high impacts that maybe you're running a little bit and those are loads and maybe you are also doing a little bit of like fascial mobilizing work at the same time. That adaptation is to all that you do, not necessarily to the one thing that you are consciously doing to facilitate change. If you want to have your heels come down to the ground, you have to look at everything you do as an input to the calve muscles, not just the exercises. When you're thinking about your calves, your calves and your Achilles tendon are responding to 100% of the input that you are selecting and I don't think that people think about mechanical input outside of their exercise bout and that I think is the problem.

We're trying to solve the problem, our skeletal problem or physical structural problems in the realm of what can I maximize during this hour instead of recognizing that the physical outcome you are experiencing is based on 24 hours a day of input. So the amount of dollars and time and blog post and videos dedicated to what you do 1 hour of the day and not to what you do 24 hours of the day I think is the first place to start. Like before you think about what exercise, it's like, what are your calves doing the other 23 hours of the day and can you play with that because there's much greater surface area there.

Robb Wolf: Right.

Katy Bowman: I guess if you will.

Robb Wolf: Right, right, no, I love it, I love it, love it. Let's shift gears a little bit to lymphatic flow. Cindy asks, she says, if this is two questions, please choose 1, but I think they're related. So Cindy is sneaking in 2 questions here. Please elaborate on pressure systems within the body and how they are changed/improved by movement and how those changes and pressure can improve lymphatic flow throughout the body and maybe even before that, why do we need lymph to flow at all. What's lymph doing?

Katy Bowman: Yeah, what's lymph? Well, like you have a lymphatic system that is part of your immune system, integral part of your immune system and that I guess the easiest way to talk about it is just like, it's like the difference between running water and stagnant water. It's filtering, it's clearing off the waste that happens as you're created by your living, like your exhaust if you will.

(00:40:09)

So you want it moving. I mean, it's running right alongside your vascular system. So you've got your gas exchanges happening between from your arteries to your veins and the lymphatics are there and all of that should be flowing along. The blood is flowing along and the lymphatic should be flowing along and again, they're organically related because the lymphatics have – your arterial system, your vascular system, your cardiovascular system has a pump. You have your heart as a pump clearly, but your vascular system, it has its own – it can move itself like it has its own small pumping mechanism, but it depends heavily on the musculoskeletal system to drive its motion.

So it doesn't have its own pump. Like if you lie down and stopped moving, you couldn't do that for very long, but your heart could at least keep your blood flow and with lymphatics, it doesn't have that super solid pump. Its function is directly tied up into the movements that you're doing. So that's lymphatics and so I know who Cindy is and I know kind of the question that she is asking. So I talked a lot about – I believe she is asking because did you see the new discovery of the nervous systems lymphatic?

Robb Wolf: Oh, yes.

Katy Bowman: System right. So that's going to be interesting because there are, in general, I guess may be four that you can measure pressure within an enclosed system. So you have pelvic pressure, you've got intra-abdominal pressure, you've got thoracic or intra-thoracic pressure and you also have inter-cranial pressure. So when they put a pressure device in any of those areas, there is pressure there and that pressure changes based on like all pressure is based on the amount of stuff like.

So I will explain pressure in terms of a room. You've got a room and it's full of kids. The more kids in that small room, the higher the pressure. You can decrease the pressure by making the room really big or you could also decrease the pressure by taking some kids out of the room. So there is a relationship in terms of pressure, the size of the container, and how much stuff is in that container.

Robb Wolf: $P1V1 = P2V2$.

Katy Bowman: Nice, nice.

Robb Wolf: Just to go complete geek fast, yeah, yeah.

Katy Bowman: Well, it's so funny because I remember learning the quadratic formula to a song and I'll never forget it, but I feel like what you just did was like that was a way – is that the way you memorized it, saying it like that?

Robb Wolf: To some degree, yeah, yeah.

Katy Bowman: It was like little R2D2, it was like, just like R2-D2-R2-D2-D2-DeeDoo-Dee-Doo beat to it. Anyway, I really feel compelled to sing my quadratic formula.

Robb Wolf: Do it, do it.

Katy Bowman: Alright, you're ready. X equals the opposite of B plus or minus the square root of B^2 minus $4AC$ and yo, don't forget, it's all over $2A$.

Robb Wolf: Nice.

Katy Bowman: Yeah, that's for Mrs. Mutafian

Robb Wolf: Nice.

Katy Bowman: In 10th grade. That one was for you, Mrs. Mutafian. Alright. So anyway, where were we? We're on pressure chambers. Okay. So pressure, you are a single structure, but you are made of lots of smaller compartments, but those compartments have soft walls. So we think of like the diaphragm is being a barrier between your abdomen and your thorax, but it's a fluid barrier, right. It can move. It can come up. It can go down. So the activity of the diaphragm can change the pressure in the thoracic and in the abdominal cavity, that those pressures are always in a relationship. All of your pressures are in a relationship and then you can also tense your abdominal muscles and if your diaphragm doesn't change, that will increase your intra-abdominal pressure.

You could also tense your abdominal muscles, but then move your diaphragm, in which case, you wouldn't tense your abdomen. You wouldn't increase your intra-abdominal pressure, but you would increase the pressure of the room upstairs, right, the thoracic one. So you are

constantly affecting your pressure by what muscles you're contracting. The sum total of all the muscles that you're contracting. Then we think of like, but there are tubes of things flowing through these pressure chambers.

So I was thinking about this and going okay, so you've got – let's say you have a straw and you're trying to suck a smoothie up through a straw. But then someone comes around and puts a fist around your straw. So like the smoothie in the straw is like your lymphatic system, the straw and what's in it are the lymphatics and the gunk that's trying to move onto the lymph node to be processed. So now you have a hand around it. You've structurally squeezed it, but let's say that I don't have a hand directly around the straw.

(00:45:26}

Let's say I have a balloon and I put the balloon around the straw and then I put my hands around the balloon around the straw. So my hands in this case are my abdominal muscles. The balloon that's wrapped around the straw is your abdominal viscera or your guts and then you've got this tube going through. So when I squeeze everything, my muscles push on my guts, but then my guts are pushing on the tubes and that tubes, those tubes are going to push the stuff that's inside the straw up or down depending on the sum total of pressure.

So in that way, lymphatics and all flow are influenced by the environment of the body that they are flowing through. That movement when I'm talking about movement affecting flow, it's not only the movements of like you're pumping arms and you're pumping legs when you're walking around. It's also the tensions that you keep, that tension that muscle contraction, you suck your stomach and all the time, you want to keep your TVA activated all the time because you believe that in order to support your unmoving spine all of the time, you have to keep your TVA on all the time. Like you end up changing the pressure systems and that those pressure systems influence flow through the tubes through all of your smooth muscles.

So like it affects even digestion so that's why we talk – people who have a hard time digesting their food, I have them checked first of all even before we get to diet, which I don't do, would be like well you've been sucking your stomach in for the last 40 years and so you in fact are down at the bottom of your smoothie straw clenching it. You're physically preventing the motion of food through your intestines. You're altering that mechanical environment because of what you're doing with your muscle. So muscle tension and flow go hand and hand because pressure is like a structure, right. Pressure is like a fist. It can push on it. Even

though it's invisible, it's still pushing and pushing on fluids, moves fluids around. So that's my final answer.

Robb Wolf: No, I like it and I was off thinking jujitsu thoughts about because pressure, balance, timing all that stuff is a big deal in the flow of jujitsu. So it's a kind of fractal and stuff so...

Katy Bowman: Yeah.

Robb Wolf: Okay. Now we're down to 6 listeners from the six that usually fall of the show now that we've gone completely geek fast. Let's pull some folks back in and talk about some squat mechanics. Joe says, I can squat with parallel feet just fine, which I do as per the recommendations of Kelly Starrett. Adding weight however, I end up on the outside edges of my feet. My toes really want to be pointed out. Should I squat with pointed toes or will this exacerbate my lack of mobility? I have some thoughts on this one too.

Katy Bowman: Well, I mean, I think that the question is – the answer that I would go for is you need to be working on mobility exercises so that you can carry more weight in the position that you want. So either the weight that you're adding to your squat is too much or it is too big of a leap, right? So when you turn your feet straight, you could be doing that turn in at the shin level. You could be just rotating in the lower leg bringing the foot around or some people just try to turn their foot in at the ankle, in which case it's, not really a turn in as much as it's a weird twisting or bending of the foot.

So the answer would be – or my encouragement would be you need to start working on the mobility of the foot and your lower legs as a separate set of exercises. Then you could look at where you can squat and then start adding small amounts of weight and see at what point you have exceeded the amount of letting your feet participate in your workout, right. So it's kind of like it's a way of throwing the lower leg under the bus. It's like my lower leg, my knee cannot bear the load that I'm trying to carry in this position. So I'm going to move my lower leg out.

In fact you're effectively strengthening, the turnout of your lower leg eventually setting up where you've got a permanent structural adaptation where your lower leg rotates away from your upper leg. Meaning that, since that's the highest intensity thing that you're doing in terms of force generation, so when you adapt a structure, you don't only adapt to static positioning, you adapt to really high loads. The loads that

you create in different positions matter when it comes to structural or mass distribution.

(00:50:35)

So if you really want to squat heavy with your feet pointing straight ahead where you're using your foot and your ankle and your lower leg and your knee and your upper leg and your hip together, then you would want to drop your weight way down and slowly start adding to see at what point is my weight exceeding the participation ability of my lower leg and start there, and in that way, you can close that physiological gap over time. You're going to facilitate it with some corrective exercise, but you can also go for the heavy loading, but it's like why it shouldn't your heavy loading also involve your lower leg. If you do that enough, train for heavy with this kind of malformed lower shin, then you'll never be able to have this kind of upright structure when you're not heavy lifting, which is going to be most of the time. Final answer.

Robb Wolf:

I didn't know I like it. You know some of this recommendation or I guess the whole recommendation really stems from that parallel foot position being representative of maximum torque, maximum force generation with kicking, running, jumping, change of direction and what not. So I guess to your point, why not strengthen in that kind of advantageous athletic position versus reinforcing something that's going to force a toe out position, which really isn't as advantageous for this other athletic broader movement categories.

Katy Bowman:

Yeah and then also – I'm almost never approaching it from an athletic perspective. I'm approaching it as like a knee integrity longevity thing. So it's like – if your goal is – it's a two separate goals. I'm looking at what are the things that you want your knees to be able to do, I mean, it's again, it's really thinking outside of doing the exercise now and being able to do the exercise in the future. It's more about what is the function and the flow and the cellular loads to the leg as a whole. Like what about the nerve that comes through the hips like to the feet and how are things that are totally unrelated to exercise, diseases that seem totally unrelated to exercise not just things like I torn my ACL, lifting this really heavy thing or whatever, like actual neurological functions and neuropathy and I can go on and on. How are those affected by what you're doing?

So what I see with this person and it's a place where we're all at. What I see is this person going – I can keep good form with no weight, but I lose good form with heavy weight and so it's the same thing. It's like I can breathe just fine sitting on the couch, but I come out of breath when I try to run 20 miles. It's like, well then, why don't you start walking first.

Robb Wolf: Right.

Katy Bowman: And then why don't you start walking-jogging combo and then why don't you – it's just again, it's about a physiological guideline. It should occur I think to every trainer or exercise out there that you're just lifting too heavy for that form that you want and so just see what happens. Like it would be really cool to train this person to not be able to lift as heavy as possible where that was the variable, but how heavy can you lift within a particular form because that's a whole different variable and then he can play with that. He can still go back to his other one, but if he's only doing that, you are strengthening, it's not a turnout of the foot, it's a rotation of the lower leg away from the upper leg.

Robb Wolf: Uh-hum.

Katy Bowman: It's actual shank rotation. So if you think of your vessels going through from your hip to your feet as tubes, you've now twisted the tubes. The tubes have a rotation in them. Rotation of the tubes are fine. Rotation of the tubes almost every minute of your life not fine.

Robb Wolf: Uh-hum, uh-hum.

Katy Bowman: So again, it's thinking about different, like a lot of them form arguments, form like in lifting form or form for exercise in layman or whatever, always kind of stems down to like this idea that this posture is bad, this posture is good, but all movements that you can do are good. It's about the frequency and the adaptation to a particular frequency.

(00:55:11)

So what happens when you introduce bends or rotations into tubes and then start to see the adaptations to those rotations? You know, that is potentially disease making, right, because it's load on the cellular level, like loads in through the blood vessels and that's in the cardiovascular section of Move Your DNA, like what happens when you introduce bends and your arteries and aren't supposed to be there or shouldn't be there with great frequency.

The bend is fine. It's just that when you put a bend in a blood vessel right and your rolling balls down the hallway, blood vessels, blood flowing rolling balls down the hallway and all of a sudden, you bend that hallway. You're still rolling balls down and you end up getting a trauma on the wall. But if that bend is only temporary for like 7 or 8 things or 7 or 8 minutes or even 25 things that you do that day, but it goes away, then that wound has a chance to heal, but it's these bends that sit here

indefinitely that can induce genetic changes to the lining of your arteries. So that's what I am most concerned about for – what's this guy's name?

Robb Wolf: That was Joseph.

Katy Bowman: Joseph.

Robb Wolf: Yeah.

Katy Bowman: Joseph, Joseph! You could lift heavy with your feet pointing forward if you just had a more detailed exercise program.

Robb Wolf: Maybe more progressive.

Katy Bowman: Progressive.

Robb Wolf: More progressive approach.

Katy Bowman: Yup.

Robb Wolf: Yeah.

Katy Bowman: Yeah.

Robb Wolf: Yeah, I like it, I like it. Okay, let's talk mechanotransduction. Raphael says, hey Robb and Katy, please expand upon the mechanotransduction and specifically how it relates to health issues, which may not necessarily be associated with movement issues and injuries. For example, how would inappropriate tissue compression or sedentism induce changes in a cell, which can be characterized as a disease phenotype and I think you talked about this a bit already, but may be in talking with lymphatics, it seems like you talk a bit about this.

Katy Bowman: Yeah and that's one. I mean, that's like a non-exercise one, but I think what Raphael and as is, a bit of cells in your arteries going from atheroprotective to atherogenetic where you're actually inducing an epigenetic change where a tissue which was not before, which was resisting plaque is now accumulating plaque because of the loads that you're applying to it. Like that's not necessarily associated with exercise.

But I mean, even like with things like cancer, he might be talking about things like cancer. But I think in general, with mechanotransduction, so mechanotransduction just for anyone who is just listening for the first time is the process by which the cells sense and translate mechanical

signals into biochemical signals and then the cells can adjust their structure and their function based on that input. So it's not really well known. So like this is kind of all brand new, but in general and so this is what I'm working on. This is what I'm working on right now, some couple of different papers and movement as a whole. I'll just call it exercise because what people are looking at is exercise for the most part. What researchers are looking at is exercise.

Exercise is believed to be protective of disease in two different ways or they might be, they're working together. It's not quite clear, but exercise can affect the mitochondria or like the number of mitochondria or the effectiveness of mitochondria and/or it's influencing the genetic expression. So that's how it's kind of understood right now. My contribution – so I'm not a geneticist, I'm not a cellular biologist, I'm a biomechanist.

So my contribution really to this discussion has to do with, right now, when we think of exercise and the benefits of exercise, the literature assumes that the benefit of exercise is global. So when you exercise, there is a global improvement to the mitochondria or to this influence in genetic expression for like a healthier phenotype in general, like a healthier phenotype. But it's a mechanotransduction and things like genetic influence or mitochondria, the effect on mitochondria is measured cellularly. It's measured regionally, locally, this pullout of cell.

(01:00:09)

So my contribution is that is helping people understand how when they are moving. I'm going to go out for a run. I'm going to go do a workout. That way that we see the benefits of exercise are global. In that, I've improved because the variables of measuring it are global, like I've measured my blood serum levels of X, Y and Z. My heart rate was this, my blood pressure is this, their whole system evaluations, yet there are these pockets of disease that are arising in people who are still exercising.

So then the contribution is you are not moving all of you. You are moving not only too little as an entire structure. That there are parts of you that aren't moving at all even when the whole entire structure of you is going for a workout. So we've been on this path for a while with this idea of going, even if you're really fit in this way, you probably need to cross train a little bit because when you get really fit in this way, there are these kind of cellular breakdowns that then lead to a musculoskeletal injury.

So let's vary it up a little bit so that you're strengthening more of your parts, like we always talk about it in whole parts, like the front of your thigh is stronger than the back of your thigh. So do some exercises for

the back of your thigh where I'm usually talking about movement on a cellular level where there are these pockets of cells that are doing really well and then these pockets of cells that are not. But it's still related back to, that a lot of your muscles are moving, that we can get by doing something whole body, but still using very little of our body to do it, and I'm starting, like there's a lot more trend towards this idea of elastic. It's like, you use this motion, you can get, you can do this exercise by calling on your connective tissue to launch you in it because there's no energy caused.

You don't have to muscularly contract to let your Achilles tendon recoil when you're running, like that's elastic, but the benefits of exercise come from the muscular contraction part. So we have this kind of idea because we've isolated performance and we're thinking about conservation of energy. The body is trying to conserve energy so it's natural to move towards elastic, but the reason we are moving so greatly towards elastic types of movement is because we are sedentary. We are totally sedentary people, the people who are not sedentary differ only from the sedentary population by 60 to 120 minutes of a day and so everyone is sedentary.

Everyone listening to this is sedentary unless you're not, but for the most part, there are two new categories of people in research, sedentary and active sedentary. There are not populations who are actually moving many, many minutes throughout the day throughout a lifetime and for the populations that are moving a lot, like I'm thinking of like people who are doing manual labor, their ranges of movement are very, very small. The degrees of motion of their joints are very small even though the minutes of movement would be very high because we are talking about a biochemical response to a particular mechanical deformation.

The degrees at which you're joints are articulating affect which muscles are contracting and secreting these biokines. That without this why the variance of degrees of use of all of the number of muscles throughout your body many, many minutes a day, we are not seeing the full expression if you will of the protective benefit of exercise. It's in these tiny pockets.

So my contribution is that you cannot apply the fact that you exercise your whole body because of what your heart rate and whatever to the entire body. If you're going to evaluate the local benefits whether it's a change in the genetic expression or the concentration of myokines or the number of mitochondria that came about because of this exercise, you have to also start talking about movement as a cellular phenomenon

regionally as opposed to what your whole body did. Because that's I think that's the piece that is not integrated yet. It's like, hey, I went out for a run, and it's like, yeah, but most of you did nothing for that run and that the shoveling around of your blood and the response, the adaptation is only to those few parts that were working and the parts that are working are getting lesser – fewer in number. I think is the right English there. I don't know if it's lesser or fewer. I think it's fewer when it's countable.

(01:05:35)

Robb Wolf:

Right.

Katy Bowman:

Are becoming fewer in number because your structure is still looking like it's wearing high heels in a chair when you get out and so you just kind of keep snapping back to this position and you're using the snap back to facilitate your movement and not muscle contraction. So the active sedentary population fares much better than the sedentary, but the hypothesis is not nearly to someone who is actually moving all of themselves all of the time.

Robb Wolf:

So interesting and quite an additional wrinkle to all that. Because I mean it's hard enough to, like I've mentioned earlier, within this kind of hyper-specialized world, if you do have a situation where you can do some pretty active work as part of your day, it does end up really. Like we're out on a 2 and a half 3-acre farm now and I do some shoveling and picking and hoeing and racking and all that and I noticed that it does still trap into a pretty small frequency distribution of what I'm doing and I end up trying to be as efficient as possible on that process.

Katy Bowman:

Sure.

Robb Wolf:

Yeah.

Katy Bowman:

Yeah. Well, I think again it's habitat, like farms on a natural habitat. Like it's you're moving towards it, but it's still, like of your stuff is still within 3 acres of you, like the bulk of the time as opposed to really needing to move to get what you needed. Like there is just, I mean, I don't even – like I try to follow my kids around and doing all the movements a day in one day and I was like holy crap, I'm exhausted.

Robb Wolf:

Right.

Katy Bowman:

Now, imagine following a population of people who actually had to move. Like my kids are moving because it's innate, like at least there seems to be this innate, like I want to move all the time, but when you follow other, like if you are following a nomadic hunter gathering population

that's on the planet right now, I think the amount of movement would be exhausting. Like it's just, I mean people where I try to stand all day up this at the Paleo FX conference and my legs are tired and it was like, we are tired, our legs are not even strong enough to hold us, not using a chair at a conference, which is 6 or 7 hours.

Robb Wolf: Right.

Katy Bowman: How would you actually fair out really trying to do not these isolated feats, right, people have trained themselves like I could totally run 7 or 10 miles fast. It's like great, but could you then walk 11 more miles and then could you go carry your kids up to get somewhere like and what about the older people, like it's just so... The discrepancy is so huge and I don't think we can put it in our minds yet about the level of movements, the variance, not just the number of minutes, but the variance involved, the things that you would have to do.

Robb Wolf: Right, right. No, it's funny because I lift some weights, do some gymnastics, compete in some old guy Brazilian jujitsu and when I throw Zoey in a backpack to go for a little stamp around the neighborhood, my foot muscles get incredibly fatigued and very, very quickly. Even if I do a walk without Zoey, if I'm pulling some pretty good heels and trying to keep a pretty good clip, my foot muscles like I'm kind of like, oh I can motor through this, but they are clearly fatigued, clearly not up to snuff and I mean, I'm just walking.

Katy Bowman: I know.

Robb Wolf: And I am inadequately prepared to go for a 2 to 4-mile walk around my neighborhood.

Katy Bowman: Yeah and I think it's the just walking like we just have this idea that the only parameter by which to evaluate exercise is intensity or heart rate. So if my intensity or heart rate is low, it must just, like you are still using many, many muscles and many different joint configurations and that's what you're adapting to is all of that. You're adapting to that just as much as you're adapting to intensity and heart rate and...

Robb Wolf: Right. It's funny right, before I jumped on the call with you, I was reading a piece on conditioning in the May athletes and I was going to skip this one question because we're kind of running. Are you okay for a couple of more minutes?

(01:10:17)

Katy Bowman: Yeah, I'm fine, I'm fine.

Robb Wolf:

So this guy Joel Jameson, phenomenal in the May coach really has had huge success in building the gas tank on a lot of his fighters. But to facilitate that, there is this need, like he wears – he has this folks where heart rate monitors and heart rate variability monitors and for different training adaptations of the cardiovascular response and parasympathetic versus sympathetic response. You need to keep the heart rate within this really tight parameters, which things like aerodynes and stair steppers and Versa climbers really lend themselves well to that because you can meter out a very prescribe dose, it's like an IV drip. It's like, okay, I need to be between a 130 and 135 beats per minute. I can totally wire that in on this contraption.

When I get out around my house and particular around Reno, everything in our neighborhood is either up or down for trying to do conditioning to improve specifically my jujitsu. It's very, very hard to get that type of stimulus from being out and getting that mix movement palate. But yet, the things that I can do to get the adaptation theoretically will help the engine from my jujitsu ends up being a very limited movement palate and from an orthopedics and kind of long term aging perspective is probably not that good.

Katy Bowman:

Yeah. Well, I mean, again, it's another way of, I don't want to say specify. It's not like your – it's a specialization right, your specialization. Your body is specialized for jujitsu and all of our bodies and you're trying to train yourself that way and we are all specialized to doing exactly what it is that we have been doing. So if you want to be – can we be – I think that we can expand this term like when I think specialized, I think that we are already pretty well specialized as human beings. But what we're specialized for our having more humans. Like to me, that's the biggest specialization, it's like you're going to -- and I'm not using the term I think in the way that other people would use the term, but what I'm really most... I don't want to say concerned with, what I'm most interested in is we're having a problem really with humans moving forward other humans without technological intervention. So if we're losing our specialization to make more humans so that we can be specialized to living in our houses and sitting in our chairs, like that's the only question I'm working on, is like what does that mean, what is that, what is that all about.

People will – they will send me a picture of Wall-E here, watch Wall-E. Maybe we talked about Wall-E before like look at this ridiculous people and their chairs floating around and it's like well, they're specialized in their chairs. We are just on the cusp, but I got a question, it's like why do I

care if I can wiggle my toes, like who cares about minimal shoes. I have no need to wiggle my toes. I do not need to wiggle my toes. I have this structure that I can buy and put around my foot that protects my foot and it's like, that's fine, but if the wiggling of the toes is part of the engine of the entire machine you slightly lose it, then the people sitting in their Wall-E chairs could have the exact same argument.

It's like why do I need to use my legs. I have a chair that will get me from point A to point B. So it becomes quickly a slippery slope if we don't see the need for movement because of some convenience that can move for us. So in that way, it's like, there is not really any difference, like why are the people in Wall-E so bad? like if they don't need to move, if something is being given to them, like the benefit to adaptation depends on you continuing to live in the environment in which you are suited for. So the only reason to be concerned with not being able to use your legs or moving your toes is in the case of that shoe or that motorized chair is not available.

We, at this time, cannot foresee the time in which every technological advance, which is powered by fossil fuels and labor of other people in different places and minerals from the ground that take quite a bit of human effort...

(01:15:10)

Robb Wolf:

Energy.

Katy Bowman:

Energy, but also like on the backs of other people who are suffering to get it, it's like that is the environment to which we are adapted to. So when we're in Iceland, we went to the – not the Viking museum, but it's equally horrific. They are talking about the people who came over with their very primitive star navigation skills and they didn't even have a compass. The imbeciles and it was very quaint, like how quaint the skill of navigating by the stars is because we have compasses now, like we have actual GPS. So like we were able to create this and yes, a few people were able to create it, but the bulk of the people just know how to facilitate pushing the buttons on those things, so keeping that in mind. So we are laughing about that. It seems like a primitive skill where to me, navigating by the stars is way harder than using my iPhone to figure out how to get somewhere.

Robb Wolf:

Right, right.

Katy Bowman:

So now there's a new plant identifying app, that is, like the one that's like a song. Remember like that song identifying app?

Robb Wolf: Oh, right.

Katy Bowman: Which you put it on. So the same technology is being used for a plant identifying app. So you can be out and you can, is it edible, is it poisonous and you just take a picture of it and it's not – don't go searching for it. I think it only works in France. They're trying to get a more global plant database, but right now, it's like French. So if you're in France, I guess you can get it. But I was thinking, so when we have this app when everyone has this plant identification app, like are we, do we feel ourselves like more better able to survive than those people who used to just have to know this in their head, who just knew it through hours of experience to be able to do it. Like who is more skilled, the person who can, who knows this, like embodies it, or the person who can operate the app to identify it for them? Like how will we come to view, like will it be the same way of us looking back on these primitive skills, like we'll be like this primitive people, they actually used to have the...

Robb Wolf: Rub sticks together for fire.

Katy Bowman: Clutter their brain, yes, rub sticks together and clutter their brain with all this information when this information can be just be put into this device, but should that device be no longer available or there is no place to charge it or there is no energy to charge it with. Now, you are back to being unsuitable for the environment and you're at greater risk, right. So I always just think of the environment is dynamic. The habitats, the ecosystem, like right now, I look at how many other support things that takes for me to do human things like eat and go to the bathroom and have a baby. And when I started seeing like huge amounts of technology being required to do the things that we were already specialized in because of our decision to be specialized and other things, that's interesting to me.

Robb Wolf: It's super interesting and that's part of my sustainability more important than abs and this freaks people out. It's pushing good food and movement is already kind of an uphill battle when you start talking about eventuality of oil being \$300 a barrel and food transportation and all that stuff. It's a huge buzzkill for people, but I think it's worth putting a little bit of thought towards in your day-to-day existence and planning and all that. Well, Katy, we're at about a hour and 20 minutes.

Katy Bowman: Holy cow.

Robb Wolf: I could seriously talk to you for like 6 hours a shot here. Where can folks track you down on the interwebs?

Katy Bowman: You can find me at restorativeexercise.com, which links to my blog Katysays.com or our Facebook page is pretty popular, Twitter, Aligned and Well Program is the handle for Twitter and Facebook, so you can come over and say hi.

Robb Wolf: Cool, awesome. I frequently do and I'm always fascinated by the things that you're talking about. You are still one of my favorite guests that we've ever had on here. I usually know what topic well enough that I can have some pithy follow up questions and what not, but when you are talking, I am so focused on learning what you're talking about it and my pithy rejoinders are not quite as pithy as usual, so but that's good. It's a huge treat for me, really appreciated having you on the show again. Let's do this in 4 or 6 months get you back on here if you're game for it.

Katy Bowman: Sure, always.

Robb Wolf: Awesome Katy. Take care. We'll talk to you soon.

Katy Bowman: Alright. Thanks Robb.

Robb Wolf: Bye-bye.

(01:20:15) End of Audio