

Kara ([00:03](#)):

We have all heard the advice eat right and exercise. And we discussed with Dr. Penny Kendall-Reed last week why telling a patient to eat right is lazy advice. And of course, as functional medicine practitioners, we want to have more of a personalized approach, so eating right is going to be different for everyone. And nutritional genomics helps us understand how to finally eat right for our own bodies based on our genetic variations.

Nathan ([00:31](#)):

And today, Kara, we want to talk about the other half, and exercise. It always goes together, eat right and exercise. And what does that mean? And it's the same song over and over again, just work out. And there's so many caveats to that. And we see all these TV ads with the funny things like the Shake Weights, which I think are hilarious, and the Bow flexes, and this is how you're going to obtain the body of your dreams. And so I think back to when I was exercising and trying to exercise, and I was running long distances. And I must say, because of my genetics, it was the most miserable experience of my life. And because I have both copies of the inflammatory IL6, running long distances really was not for me.

Nathan ([01:19](#)):

And what it ended up doing is, I hated it. I never recovered, so I quit working out and I quit exercising. And that is definitely not the right solution. So that's what we would like to explore today. How do we create a solution that is long-term, and people are able to continue for long periods of time without those negative effects?

Kara ([01:39](#)):

Yeah, for the long journey. Functional medicine is definitely a process, and it's for the long journey. And we want to help patients feel good when exercising. And it turns out exercise can be just as unique as eating right. And there are a lot of answers and clues, insights, in our genes to help us personalize exercise recommendations, rather than the multimillion dollar advertisements for weight loss and exercise. And furthermore, it's apparent that enter individual variations exist in the response to exercise induced muscle damage, which brings us to a good point of how we respond and recover to exercise, not just what type of exercise we're going to do.

Nathan ([02:21](#)):

Yeah. Exactly. How are we going to respond? And another thing that's an important point is patients need to understand you're not going to exercise your way out of a bad diet, so be sure to listen to episode five and six, which cover the role of neurotransmitters and metabolic hormones, and the roles they play in weight loss. And I think when you can put these episodes, or these genetics and hormones together, you're going to have improvement in your overall health. And for a lot of people, of course, we're talking about weight loss. These systems in our body do not exist in isolation, and they're all related, interacting with one another constantly.

Nathan ([02:58](#)):

And in today's episode, we're going to talk, bring exercise into the mix. And you will see how this plays a role in what we've talked about. And Kara, it's been really a great exercise for me because I've been doing a lot of research for this podcast.

Kara ([03:09](#)):

Great exercise for you.

Nathan ([03:11](#)):

Yeah, great exercise for me, just to make sure that I understand all these connections. And what's really interesting to me is the role that exercise actually plays in dopamine and neurotransmitters. And one of the studies, and of course, this was in mice, we can't necessarily extrapolate, but they really showed that we get a huge bump in dopamine that lasts three to four hours. And this has really borne out in my own routine, in that I noticed that my focus is much improved when I get the right kind of exercise. And we'll get into what is the right kind of exercise for each person. But our cravings, our snacking, our focus are all improved.

Nathan ([03:50](#)):

And then the other thing about exercise that really was enlightening to me was that through this dopamine surge, we're actually able to lower things like interleukin six and tumor necrosis factor, which are inflammatory hormones. And so this is really, really important because now we have another way of improving neurotransmitters besides just giving L Tyrosine for dopamine, or 5-HTP for serotonin. We can look at exercise as not just creating that important part of eating right and exercise, but you're also affecting a lot of things in other places besides just your muscles and your heart. And another thing with exercise is that it's really controlled, help control, my leptin levels, I mean, improve those leptin levels, which really control my hunger hormones, which I'm a huge snacker. And I notice that I don't need sugar anymore, not near what I was craving it before. So that's really just huge, huge point I think that jumped out at me as I've looked at all of this.

Kara ([05:03](#)):

Yeah. I love how you said this has been a good exercise for me to connect the dots. That was funny to me. But this episode really pulls in together all the previous episodes. We're talking about mental health. We're talking about neurotransmitters. We're talking about the inflammatory cytokine storm. We're talking about leptin and ghrelin and the metabolic hormones, and how exercise really then is also a big piece to this picture for patients. And so even today, we're going to explore more beyond the dopamine availability and mitigation inflammation and creating exercise to prevent injury. Right? We're going to talk about all these today. But we're all going to take into consideration how to optimize outcomes based on timing of exercise too, which is an incredibly important conversation that I don't hear often discussed.

Nathan ([06:01](#)):

No, Kara. That's the big thing. We see patients as functional medicine doctors. And we are like, "Okay. You're going to eat this way. And then we want you to exercise three times a week because that's just the right thing to do." They're so often, so many of these people are so sick when they see me, that's the

last thing I recommend. I said, "Six weeks, you're off the hook. You don't have to exercise. We'll do some yoga or some other things." And I think your story really was a great example to me, and I've applied it in my own practice a lot because it really showed what the timing means. I would love for you to share that really, kind of what happened with you in the exercise story.

Kara ([06:39](#)):

Yeah. We can learn from our mistakes. Right?

Nathan ([06:41](#)):

Yes.

Kara ([06:44](#)):

They're great teachers. So in episode two, I briefly discussed how my son's autism really set me up, and my neurotransmitters and my mental health snips, my COMT, my MTHFR, really set me up for some scary suicidal tendencies when life was so traumatic when he regressed into autism. And we moved five years into our journey, which as we know, moving is a traumatic event. And I gained a significant amount of weight during this traumatic time. And so what did I do? I started exercising. I started the P90X series, which okay, that's a great exercise, but the timing was all wrong because I was so compromised. I had been enduring such a high level amount of stress and trauma that when I started exercising, it pushed me over the edge, and I got really dangerously ill. I started losing my hair. I started losing my hearing. It got really scary. I couldn't get out of bed. I couldn't work. My skin tone was gray. And so like you said, the timing and telling patients you're off the hook is as important as it is for us to help them add movement into their life.

Nathan ([08:00](#)):

Yeah. And that's really important because when we're looking at exercise, we're kind of looking at an inflammatory event. And we're trying to teach our body adaption. And when we're already in that pathway of inflammation, we have no way to recover from that when we're missing things. We have low cortisol levels, which you definitely did at that point. You weren't getting great sleep. And you were already, as your description describes, you were already in that inflammation pathway. And so when you get done, your body needs that capacity to heal. And if you don't have that, you go further and further down that pathway. And that's why recovery's really important and why timing is so important. So I really want our listeners to take that away today.

Kara ([08:45](#)):

Yeah. I love this conversation.

Nathan ([08:49](#)):

Well, and I think it's just one that we tend to skip over because we're just like, "Oh, exercise is good." Well, yeah, it is. But it has context to it. And exercise is just like diet, if we don't give people the right type of exercise at the right time, we can cause more inflammation and injury, as I discussed. This is one of the biggest mistakes I see people making. And so if we make them more inflamed, we get them injured, which I see a lot of, a lot of injury, because injury, we get a small amount of injury when we

exercise, and then our body adapts and makes us stronger. But if we can't recover from that, then we really set ourselves up for big injuries. And there's actually some snips that can show us where we may be at risk there. So I think it's really interesting. And then we can really talk about: How do we make exercise the essential element of health?

Kara ([09:41](#)):

Yeah. Okay. So let's jump in. Where, Nathan, in our Pure Genomics report can practitioners go to glean some insight, so to reduce the guesswork, of how people are going to respond to exercise, and what kind of exercise, and how to prevent injury, and how to help them recover, and how to improve mood and reduce inflammation? So where do we start?

Nathan ([10:05](#)):

Well, I think the first place we start is: What type of exercise is enjoyable for the patient? What is going to keep them exercising? And sometimes, and a lot of times, genetics will give us clues there. A lot of times, people have kind of already figured it out through their life. And so you can kind of talk to them about that. I don't think we change the exercise they enjoy based on these genetics I'm going to discuss. I think we go with what they enjoy. But we may be able to get some insights to what they can have more maximum performance with and other things. So we're going to do a little bit of alphabet soup, the dreaded alphabet soup of genetics. And I don't want people to focus as much on all the letters and numbers, but I want them to understand these categories exist within platforms like Pure Genomics, so that we can go right to them.

Nathan ([10:54](#)):

One of the first things we see when we look at a genomics report or the type of exercise, there's ACTN3, A-C-T-N-3, which is really talking about our fast twitch versus our slow twitch. We have muscle profusion, which is determined by ACE, A-C-E, which is also related to blood pressure. And then one of the most important polymorphisms is IL6 and TNF alpha, which tells us how our body's going to respond to the inflammation of exercise. And I'll come back to that. Then we have some really good leverage points. This is our response to exercise. These are not all of them. There's some more that are in the reports. One is LPL, how well we're going to burn fat with exercise. How great would it be to look at a patient and go, "You know what, if you exercise, you have a predisposition to losing fat"? And that's going to give them something to really focus on and say, "Okay. Yeah, I've got the genetics to burn fat." And that's leverage points. And LIPC also improves our glucose resistance, so we have less glucose resistance.

Nathan ([11:59](#)):

Another category that I think before anybody starts exercising, and I'll have a short story I will share a little bit later about this, would be looking at COL1A1, COL5A1, and MMP3, which determines how our ligaments and our tendons are going to respond because if we get injured, we're not going to be able to keep exercising. And then the final thing that I would like to kind of talk about is athletes and diet. Come back to episode five and six, and kind of talk about some of the downfalls of being too strict on certain diets and how it may affect our athletic performance. And I'm really excited about discussing all these things right after this.

Kara ([12:44](#)):

Genetic variance may affect an individual's performance or risk for certain exercise, but should not preclude any person from participating in the sports or the movement that you love and enjoy. In today's episode, we are focusing on the everyday person, and those who are working on what it means to be healthy and take the generic advice, eat right and exercise, and make it personalized and applicable to each individual. So Nathan, let's begin. Tell us about the genetic variations that give us an insight into what exercise a patient may respond to more favorably.

Nathan ([13:24](#)):

Through my research and reading, I really found out the number one thing I need to be looking at with exercise is their response to inflammation. And one of the papers was really enlightening. And it said that people who do intense exercise for more than an hour, or around an hour, and they have interleukin six polymorphisms, really do not do well. And I found that out personally, Kara, because I was, when I got to Colorado, I was like, "I need to get into example. And I need something more structured." So I started Orange Theory, great program for a lot of people. It was terrible for me. I wear an Oura ring, and I was doing an hour, and it's pretty intense exercise. My heart rate was in the 80% to 90% range most the full hour.

Nathan ([14:12](#)):

And I found my Oura ring, I just never recovered. The next day it said, "You need to rest," every ... It took me a full 48 hours to recover. I didn't feel better. I actually felt tired during the day. I guess meaning I have both copies of the interleukin six, and so what it really pointed out to me, I changed over to CrossFit, which really was a lot more weightlifting, and maybe 15 to 20 minutes of high interval intensity training, high intensity interval training. And you know what, my Oura ring, every morning, you're ready to go. You're ready to go. And now I'm exercising five to six times a week. I feel energy during the day. I'm not wore out. And it was because I wasn't flipping that interleukin six.

Nathan ([14:55](#)):

So the thing to take away here is these people with these interleukin six polymorphisms, especially a homozygous like me that has both, which means I make interleukin six really well, which is an inflammatory marker, which we talked about with Sam and immunology, these people, you don't want them doing marathons and doing long distances and intense levels. They can walk and they can do things for an hour to two hours. But it really needs to be low to moderate intensity. And so that's one of the first places I'm going to look now with my patients to say, "Hey. Are you going to do better with a 20 to 30 minute workout? Or can you tolerate that hour to two?" Because we really saw the inflammation in those athletes explode if they went past that hour mark in that paper. So that's my clue number one. And as we'll talk about, I will look at also their risk of injury.

Nathan ([15:52](#)):

Then the next thing we can look at within this kind of type of exercise, is the ACTN3. A lot of attention's been paid to this. This is your fast twitch versus your slow twitch. And it has to do with sarcomeres and how they connect, and whether you're going to be a fast twitch person. The thing, this is kind of like, a lot of people look at this at HIIT versus endurance. And what you'll see this ACTN3 is that your Olympic

athletes that tend to do power lifting and sprinting tend to be homozygous for the polymorphism that gives them good muscle contraction. But when we're talking about the everyday person, we're not talking about that huge of a gain. It's not like if you enjoy doing HIIT exercise, or high interval intensity training, or fast twitch type exercises, and you enjoy it, and guess what, you're not really genetically predisposed to that, do not take a patient off of that exercise plan because they enjoy it.

Nathan ([16:53](#)):

And you know what, most of us, me included, even though I have both copies of this, I'm not going to be in the CrossFit games, or I'm not going to be an Olympian, Kara. I mean, I think we have to really look at that and say, "You know what. What do you enjoy? What can you do that makes you want to do it the next day or every other day?" And so but it can tell people that, hey, this is where you're probably a little bit more genetically advantaged. The same thing with ACE. ACE is really about how our muscles respond and how we recover. We tend to find that ACE can tell us if we have more vasoconstriction, where our arteries contract. And that's going to be more for your sprint people and more for the people that need that quick blood flow. And then your more endurance people, that have ACE polymorphisms that tend to cause vasodilation, they're going to do a little bit better maybe with doing the longer distances, and endurance, and the riding the bikes and these sort of things.

Nathan ([17:51](#)):

So that gives us some insight. If people are like, "What exercise do I do?" That's some places that we can look. But I think a lot of people have already kind of found that through their life, what they enjoy, what they feel good about. Just like me, I had to learn. And I went back in my genetics and I'm like, "Holy cow. No wonder I was having this issue." Another thing that, and this is kind of a leverage point too, is we have genetics, PPARC1A. Thank God I'm reading it. I can't remember all these letters. But this is our aerobic exercise, how well we're going to do with aerobic exercise. And so this could be a leverage point and say, "You know what, aerobic exercise is going to be just fine for you."

Nathan ([18:30](#)):

And the thing to remember about these when we look at them and we try to make sense of them, they're going to be a mishmash, Kara. There's very few people that are going to line up and all of a sudden, it's going to be really clear, this is the exercise you should do. And those people probably are the Olympians. And these people are probably the ones that are really genetically advantaged, while the rest of us, really everyday exercise people don't have to worry about that as much. But it can be some things we can give insight into patients.

Kara ([19:00](#)):

All right. So before we jump into response to exercise, let me see if I understand this correctly. So IL6 is in the immune category, and fortunately, that is strategically placed right on top of the exercise category in Pure Genomics. It's so easy to cross reference the IL6 before you start taking a look at the exercise. So we want to really look at that genetic marker first to understand their predisposition to an increase in inflammation because that will then help us to understand, hey, we may need to move them away from the ... What? The HIIT, the style, or the long endurance. It's the long endurance, right?

Nathan ([19:42](#)):

Well, the long [inaudible 00:19:43]. It's the intense exercise, like running really hard, or biking really hard, or doing things like me, the Orange Theory was an hour of very intense exercise. They're not going to respond as well. I would probably keep those people in the 20 to 30 minute range of moderate to intense, and then really kind of shut it down after that because they're just not going to recover as well, and they're probably going to cause more inflammation than they get rid of.

Nathan ([20:11](#)):

What's interesting, exercise done correctly in the right amounts actually lower our IL6 through the vagal nerve and that dopamine. So we really want them to hit that right amount of exercise, that decreases inflammation and does not increase inflammation. And TNF alpha also is a player here, not just IL6. But the studies were looking more at IL6. It's more of the sexy cytokine, if you will, in a lot of the studies. But I think that's the takeaway there.

Kara ([20:40](#)):

And looking just at that, I mean, that's very personalized recommendations, is to take them more to the 20, 30 because the time plus intensity is what's really going to drive that IL6.

Nathan ([20:49](#)):

That's [inaudible 00:20:49]. Yep. That's right.

Kara ([20:50](#)):

Okay. Got it. All right. And then the ACTN3, what I'm hearing is if you're a variant for that, then you're more probably a better fit for endurance type because of the fast twitch fibers. You don't have those fast twitch fibers to help you with those HIIT style, fast movements.

Nathan ([21:09](#)):

Well, and you're not going to see that big of a difference. It's not like you're not going to be able to do box jumps or other things that the other guy is. But you may not be that premier athlete that you always imagined you would be.

Kara ([21:22](#)):

Right. And it may be giving insight of why you're not feeling well after you're doing that HIIT style exercise.

Nathan ([21:26](#)):

Yeah, or not keeping up with Joe Blow, who's the same age as you and the same body weight, and other things. So maybe you can use that as a little bit of excuse, but yeah.

Kara ([21:34](#)):

Okay. All right. And then ACE of course is those endurance, where they're getting more blood flow to the muscle to allow them to go the distance. But like we said previously, by no means does this preclude

you from enjoying the sports, it's just giving insight. And it really sounds like that inflammatory marker is the first one you look at, and really a key to personalizing the exercise approach.

Nathan ([21:57](#)):

It is for me. I think there may be some people that very much disagree with me on that. But I think from what I read, and I'll keep reading of course, and I may come back in another episode and say, "I had that wrong." But I do think the data's there to support that. And that's really what I want my patients to keep exercising. That's the key from this podcast is: What can we do to keep our patients exercising? And me finding the right exercise on a personal level has meant everything to me exercising five times a week versus dreading it.

Kara ([22:27](#)):

All right. So let's talk about response to exercise. And the beautiful feature about Pure Genomics is that as we add more polymorphisms to the report, then they will automatically appear in your patient's report. So one test kit for the patient that they invested in is really a lifetime of information. And we have some new polymorphisms that I'm not really familiar with on our report, which are the LIPC and that glucose, and then the LPL, ADRB2. Those three in particular that can really, Nathan, just hearing you talk about it, give some extra incentive to the patient. So can you help us understand about this response to exercise in regard to burning fat and glucose metabolism, and what we can glean from this section in the Pure Genomics report?

Nathan ([23:13](#)):

Right. So these are what I call, and I mentioned it earlier, my leverage points. I love having these leverage points because I can look at a patient, and I say, "What are you trying to accomplish with exercise?" And if it's somebody that's struggling with glucose tolerance, and they're struggling with keeping their blood sugar down, I can look and say, and they're not exercising, and say, "Look. These genetics, this LIPC, shows that you doing some exercise, 20, 30 minutes each day. And we know that the 8000, 9000, 10,000 steps, all of them are helpful." You don't have to be at the 10,000 to be magical. But the more you get, the better your response is, from what I understand from some research.

Nathan ([23:53](#)):

But I can say, "Look. Getting those 10,000 steps in really will help your glucose." And it's going to be a huge part of your health plan. And we know that with this exercise, they're going to decrease their inflammation, their IL6. We're going to activate. We're going to increase their dopamine. We're going to do a lot of things, so we're going to use that as a leverage point to get all these other benefits too. There's also people, of course, that want to lose weight. And when you have these two, the LPL and the ADRB2, that really talks about fat burning with exercise.

Nathan ([24:28](#)):

And if you don't have these, which I don't, you don't quit exercising because, oh, I'm not going to burn fat. Yeah, you're going to burn fat with exercise. But you may not be burning fat as well as somebody that does have these. But if the person does have these, here's a great leverage point to say, "Hey, here's a great way to lose this fat. And this is why exercise is important to you." So that's what I really so

those as, is great leverage points. If they don't have them, you don't say, "Well, you don't need to exercise. It's not going to improve those things." Well, it'll always improve those things. But they're going to get even more benefit than somebody that doesn't have that.

Kara ([25:05](#)):

And to be clear, when you say, "When a patient has these," that means that they have those risk variants for these particular snips.

Nathan ([25:13](#)):

Risk variants are really kind of a nomenclature issue. I think you have different polymorphisms, and I think that's what's great about our report, Kara, is that we kind of got rid of, this is a risk variant as such. It's more of an advantage. I'd call it a genetic advantage. So that polymorphism is an advantage for them, so it's just a nomenclature issue. I think it's what we call it, not really a risk variant, but more of a genetic advantage. And that's why we got rid of the red, yellow and green, because it's really confusing. It's not a disadvantage if you don't burn fat. It's just you've lost that genetic advantage that these others make up for.

Kara ([25:55](#)):

And so that's why on the Pure Genomics report, you see enhanced benefit, even if they have a risk variant, because there may actually be a pro to having that.

Nathan ([26:06](#)):

That's why we changed the nomenclature, really important.

Kara ([26:09](#)):

Got you. Well, that was a good conversation. I didn't know that. Okay. So we've been talking a lot about preventing injury. And you have a really great story for this. So let's just lead in with the story that you heard recently with a patient you've been working with.

Nathan ([26:27](#)):

Yeah. So I had this patient, and the patient was exercising for two to three months. The goal was to lose weight. I had seen them after they had started all these, and we were looking at their genetics at a later date. And they were losing, I mean, lost 20 to 30 pounds in that three months. They had all the genetics. They had the LPL and the ADRB2, so they were going to burn fat with exercise. They actually had the LIPC. They were actually found out that they were more aerobic, more endurance, which was really fine. But the thing that they never had awareness of, unless you look at genetics, you're really not, is that they had all three of the polymorphisms, the MMMP3, the COL1A1 and the COL5A1. The COL, the polymorphisms really have to do with tendons and ligaments. And the MMP3 has to do with Achilles tendon.

Nathan ([27:28](#)):

And what all these show really is that you have problems with collagen and collagen deposition and strength. And so you really, besides IL6, before I started an exercise program, I want to make sure that I

look at these because this patient suffered an ACL injury. And with this ACL injury, guess what, they couldn't exercise for three months. And their progress was lost because they had injury. And so if we're not protecting them with things like collagen and vitamin C, which are pretty inexpensive interventions here, then we've really not done our job as clinicians and providers because we can say exercise, but if they're going to injure themselves, then we've just really created a negative loop here.

Nathan ([28:13](#)):

And it was really important as part of my recommendations to this patients is that, hey, before you start back, because he's getting ready, I was like, "You really need to make sure you're getting 1000 to 2000 milligrams of vitamin C every day, that you're getting collagen, so that we can make sure you don't suffer another injury," because that's where he was going, I think, if he kept exercising without that support because he wasn't getting vitamin C really, and collagen enough in his diet.

Kara ([28:39](#)):

And is it wise for practitioners to ask the question to patients about previous injuries to get an insight if they're more prone, if they've experienced this before, to know if these gene is really being expressed? And then that's also a good leverage point? We really need to [inaudible 00:28:54] into your exercise routine.

Nathan ([28:56](#)):

It is. And of course, we all go back to our personal stories, Kara. But I have all three of these genes too. So man, I'm hitting vitamin C because I'm lifting heavy weights. And I really want to make sure I don't suffer injury. And I noticed that I'm really not having any of the tweaks and the strains and the things that I was having before. But history's super important, super important. But even without the history, I think these are pretty well collaborated in the literature. And you can probably make sure that at least they're on vitamin C or something that supports those ligaments and tendons.

Kara ([29:32](#)):

And then another conversation I've heard you talk about, of course ties into episode five and episode six, just about personalizing nutrition, is the role of fiber when it comes to exercise because ... So talk a little bit about that because you were saying that.

Nathan ([29:51](#)):

This is interesting, Kara. There's some papers that show that when you really ... These athletes, weight lifters, tend to be very high protein, high fat, and then there's a lot of runners that avoid a lot of carbohydrates. And the problem is a lot of the foods with carbohydrates also have fiber. And so what we see in the literature is that the microbiome of athletes really suffers when they say, "I have an FTO. I need to do a lot of high protein," to the exclusion of they're not doing enough foods with fiber and other things. And so I think prebiotic becomes really important because when we change our microbiome, and we don't have enough bifido factor and other things that depend on fiber, that's really kind of the foundation of our gut health, it that butyrate that's create by these bifido factor. And so we really need to focus on, if we're going to tell people, "Hey, you know what, genetically, you're going to do okay with

high fat. You could do ketosis, or you can do high protein," and a lot of weight lifters do tremendous amounts of protein.

Nathan ([30:54](#)):

But guess what, it's not great on the gut if you don't have fiber there. It's not just naturally good for the bacteria. And we're going to see that. And then we see increased inflammation. They've shown without these proper ... And we all know in functional medicine, you always go to the gut. And inflammation really starts there. They're not going to reach their maximum performance. They're not going to reach their maximum energy levels if they don't have control of that inflammation through a healthy diet. So you may need to be supplementing. And these people that are genetically okay with taking a high protein diet, are okay with taking more fat, you definitely want to make sure that they're getting enough fiber because that's kind of the foundation for gut health. So I think that's-

Kara ([31:38](#)):

Yeah. That's a great question. That's a great question. And I heard you talk about athletes. But is that true for the everyday patient too? Is that a conversation for the practitioner to have when exercise is being discussed, is to inquire about the fiber intake in addition to the fat and the protein?

Nathan ([31:54](#)):

Yeah. I think that's not just the athlete. I know that's the flavor of this episode is exercise. But I think anybody, and me included, and I make sure because I tend to be a higher protein because that helps control my hunger, but I take fiber every day, a prebiotic, which I think is just essential to my health. I think we need to always be looking at that fiber content. It's my new, kind of my windmill that I'm after, is making sure that my patients are getting enough fiber because everything kind of runs on that within the gut.

Kara ([32:28](#)):

All right. So let's just kind of recap to make sure we get this big picture. So of course, the IL6 inflammatory, we really discussed that a lot. That's such an interesting conversation to take a look and see if they're a variant there because that will help us know that we perhaps really need to move them to more of a 20 and 30 minute, so to prevent the time plus intensity driving that IL6, and moving that into that inflammatory cascade. And then of course, we can look at ACTN3 and ACE to see which one may be a better fit, the endurance or the HIIT, if they don't have that IL6 consideration. But again, it's always: What do you enjoy? And how are you recovering? And how do you feel after your exercise? Are you tired? Are you lethargic? Are you not reaping the benefits from the effort? And so that maybe is where we need to take a look at the ACTN3 and the ACE and the IL6 to then personalize in a different direction.

Nathan ([33:28](#)):

That's right.

Kara ([33:28](#)):

Okay. And then we have that response to exercise that the burning fat and the glucose metabolism. And what I heard, what I really took away from that conversation was, yes, on our report, we show a risk variant. But that is where we need to remember that polymorphisms are associated with a risk or a benefit. So even though it says risk variant, there's actually an advantage to having, in some cases, to having these LIPC and LPL and ADRB2 to burn fat. And so that's why we then clearly mark there could be an increased benefit as a result.

Nathan ([34:03](#)):

[inaudible 00:34:03]. So variant really has to do with, and we won't go too in depth here, Kara, but variant a lot of times has to do with what is the majority in patient. So whatever, and it's usually in a Caucasian population, so you have to really look at genetics within a world view in a lot of cases, and understand that it's a little different there. But when we're looking at, and the variant thing, in some cases, it can be an advantage. Some cases, it can be a disadvantage. And so in this case, when we're talking about LPL and ADRB2 and LIPC, we're talking about a genetic advantage. And that's how we report it. We call it enhanced benefit. So these things, it just depends on your environment, what you're going to see with each of these.

Kara ([34:48](#)):

And that's a good point, why we moved away from the color coding because it was so misleading because there's an advantage to that. And then of course, inquiring about previous injuries is important before recommending any kind of exercise, so that we understand that history. And then taking a look at those polymorphisms, the COL1A1 and COL5A1 to understand the tendon and ligament injury probability.

Nathan ([35:17](#)):

Yeah. And those are all right there in the report. You can see all three, MMP3 as well, for Achilles tendon. So I think those are really important to look at in your evaluation.

Kara ([35:29](#)):

All right. So this is connecting the dots. Our first season has been exploring the polymorphisms that are really the foundation, that if you're new to nutritional genomics, this bath of snips are a really great place, an effective place to begin. So be sure to go back and listen to all of our previous episodes because, as we've mentioned, they're building on one another. And our next episode, episode eight, will be the last in this first season. And it's going to be a summary of all that we discussed. And so if you have questions, we want to hear from you. Maybe even we'll structure episode eight as a questions and answers from our listener. So let us know what you think of the last seven, up to now, episodes. And what questions do you have to apply this information to your patients' care? And that's really where the rubber hits the road, as you always say, Nathan, is when we can take the information and know how to apply it.

Nathan ([36:25](#)):

I'll also be giving a little bit of a practice update. We kind of started with our first episodes talking about starting a practice and integrating some practice management, and how genetics fit into that. And we'll



give you a little update of what's going on there. I'm getting close to opening my practice, so that's really exciting. But I tell you, there's a lot you can learn. This'll be my third time, and I've still got more tidbits to pass on, so we'll share a little bit of that as well.

Kara ([36:51](#)):

And we want to thank you. We are in 30 countries, over 30 countries, just in the first six episodes, so thank you for subscribing and liking and telling a friend. And keep it up because this is exciting to be having these conversations of nutritional genomics in a way that practitioners can understand how to apply them to patients' care. So we no longer have to guess. We have genuine insight into our patients' instruction manuals. So we'll be back with episode eight in a few weeks.

Nathan ([37:20](#)):

Can't wait, Kara.