# A conversation between Complement CEO Matt Tullman and Scott Stoll for Plantapalooza Energy

- All right. Dr. Scott Stoll, thank you so much for joining us in this evening. Both of us are demonstrating how to maintain energy well into the night you more so than I. Thank you for staying up with us and spending some time to share your wisdom with us tonight.

- Oh, thank you Matt. I'm delighted to be here and so happy to support all the activities that you're doing.

- Oh, thank you. And very grateful again for you making it possible. They're not here for me. Let me assure you of that there. And I'm excited to learn from you. You have some slides which we'll get into, but briefly I'll share an introduction. Of course today, we are talking about moving for energy, boosting vitality through exercise. And yeah, I think exercise has such a interesting connotation. A lot of people have very negative perceptions of exercise, right? But it's really movement.

- Oh, yeah.

- It's the most natural thing that all of us do. From a very, very young age, we're constantly moving or at least we should constantly be moving. And you're gonna teach us a little bit about why it's so important and how that is connected, right? The more you move, the more energy you have. Which you know, doesn't necessarily make intrinsic sense. You get a little tired if you move too much. I'll attest to that. But it's the energy equation that we're gonna talk about today. And again, thank you for being here. I will stop and turn it over to you, but I'll just share a little bit of your bio. I'm gonna read for my notes 'cause you've done a couple things, starting with the coolest thing to me, 1994 Olympic bobsled team. Super cool. I did not know that about you until it was put into these notes. So that is a conversation we will have separately. You're also the team physician for the Olympic bobsled and skeleton teams. You've been a physician for university teams. You've been of course a practicing medical doctor. You've published tons of books and journal articles. And perhaps most important, you're the co-founder and chairman of the Plantrician Project, the Plant-based Nutrition Healthcare Conference, the International Journal of Disease Reversal and Prevention, and the Regenerative Health Institute too in collaboration with the Rodale Institute. Did I miss anything? Is that enough, you know?

- That's enough. Thank you, Matt. That's enough absolutely. And just delighted to be here. We're gonna have a fun conversation.

- Yeah, I miss Dr. Oz. I miss Dr. Oz. I mean like, when your list is this long, you start missing Dr. Oz. That's when you know you've done a couple things with your life. So we are very excited to have you here and learn from you.

- Oh, thank you Matt. We're gonna have a good conversation. It's such a fun topic. And like you said, you know, we all have been so deeply entrenched in nutrition, it's kind of fun to pull back and look at, you know, health and energetics through a different lens, which we're gonna talk about tonight with just movement. I love it.

- Perfect. And you strategically decided to record in what looks to be a home gym. So go on you-

- Yeah, I put myself back here. And it's just a very simple gym and that's what I want people to know. You don't need much to actually really be healthy and move.

- I was about to-

- Don't even need spandex.

- I was about to say, I've got a yoga mat, kettlebells, you know, a couple different things laying around my office. It is always a good idea. I used to have a stationary bike right here, but that's another story so. Awesome. Well take it away if you wouldn't mind sharing a couple slides and we'll try to make it as interactive as possible.

- Yeah, that's good. We'll just make this a conversation. You know, I'm a visual learner, so I love like pictures and slides and so my intention is just to share 20 minutes of slides. We can extend it through a conversation, that just helped to kind of bring some of this information together, maybe in a more meaningful way for everyone that's watching. So let me share my screen here.

- We'll, I'm starting to edit out, I think I'm supposed to like clap so that they see a spike in the sound and know to come in here and like cut stuff out so, in case there's anything that needed to be done. All good?

- Good. All right. So we're gonna just spend a few minutes talking about the energy equation and lifestyle medicine and how movement really boosts your vitality. And this is a fun topic because, you know, when we get to the bottom of it, exercise, nutrition, everything that we're doing is really just to have a more wonderful life. And we have this mindset I think around exercise that it's painful. It's often been categorized as a weight loss activity. It's 90 minutes on a treadmill, sweating spandex, expensive gym memberships that we don't use after the month of June. But really, you know, I wanna focus our conversation on hopefully enlightening you and exciting you to the possibilities of moving in meaningful ways to you and what happens inside of your body that brings your body to life when you move. And your body is this incredible adaptive machine. You know, I just, I love to study the body and I love reading scientific articles because the deeper

I get, the more in awe I am of this incredible machine that we get to exist in while we're on this planet. You know, it's 37 billion billion chemical reactions every second that allow us to move, to interact, to dream, to love. And our bodies allows us to do those things because it has this incredible adaptive capability. It's also has built in reserve and resiliency that allows us to, you know, sometimes inadvertently make unhealthy choices and the body keeps going because of its adaptive capabilities. But those same adaptive capabilities that allow us to keep going in life also are magnified when we're exercising or moving. And that's what helps to build up this reserve of energy inside of us as these chemical systems come online and these cellular systems become more efficient, they naturally build more energy. That's what we're gonna talk about this evening. We're just gonna highlight very quickly, just a few categories that help us to understand how movement is related really to the generation of more energy in our bodies. We're gonna talk about the powerhouses of the cell, the mitochondria. We're gonna talk about that topic that all of us love to hear about and learn more about that we don't know that much about it any way, that's the microbiome, a hundred trillion bacteria that live in our gut. How exercise and movement enhance our brain's activity? How it impacts our cardiovascular system, which is pumping oxygen and blood throughout the body? How when we're moving, we balance our hormones, which leads to more energy. When we're moving better, our sleep is improved. And then there's like a confidence that comes in also with movement that strengthens our body and also adds to energy. So this beautiful little pictogram right here is a mitochondria. And the mitochondria are really these ancient structures in our cells that are like the powerhouses. They're very complex, but they generate energy. And they have this amazing capability to respond to movement. And you know, it's long thought that the mitochondria would just become more efficient with exercise. But what we found, both with movement and with a plant-based diet is that we actually begin building more mitochondria. And it happens relatively quickly. There's this initial adaptation after 24 hours of exercise with the mitochondria become more efficient. But within just a few weeks, your body begins building more mitochondria. And so translating that into just how you feel on a daily basis, you have more efficient mitochondria and more mitochondria that are working more efficiently. And so you have this multiplied effect of energy in the body. And this is one of the reasons we also see, you know, plant-based endurance athletes recovering so quickly and finding that their performances are improved because they've multiplied these powerhouses in their cells. Those mitochondria are also involved in kind of reducing some of the inflammatory switches in our body. And so when we're exercising and we gain this efficiency in our body, we begin turning off these key inflammatory switches. When we turn those inflammatory switches off, it has this impact throughout the system of reducing pain and also restoring some energy. We have these antioxidant systems that get turned on. We increase blood flow throughout our body. We turn on the epigenome of our body, so these key switches like PGC-1 alpha, that actually improves the efficiency again of the mitochondria. And we improve our blood sugar control. And so that translates into lower insulin levels, which also improves our energy throughout the course of the day.

- If I may jump in.

- Please.

- First of all, I never, I don't think I knew that more mitochondria were created, but to go back you used the word epigenome, which I think more and more appreciating but not nearly enough. That epigenetics, right? The expression of your genes, certain genes, as a reaction to or as an adaptation to environmental stimuli. In other words, I always joke that my third born son is very large for his age. And I swear to God it's an epigenetic expression where he has to protect himself because he has been stepped on and pushed and pulled throughout his life. I may be extending that science to a point of absurdity, but I believe it. And I think we may find out that that's true. But in a very real way, that's what's happening, right? Is that if you're out there pushing your body, right, that's a stimuli, that's a whatever you wanna call it, an event to which your body has to react. And it does so by building more of these mitochondrias that you can react more to have more energy to achieve those same things as an adaptation to regular exercise. So I just wanted to call that out 'cause you mentioned that one epigenome expression. And I think the broader point, right, is that the more we use our body, you know, it's like one of my favorite quotes from Richard Branson who always said that, you know, he takes an hour out of his morning to work out because it gives him two or three hours in his evening of more energy, you know. And so it's an easy trade off and I think so many of us will not spend the time to exercise, right? Because we don't feel like we have the time. But we don't recognize that in truth, it gives us more time, it gives us better energy during the time which we are awake and maybe even extends the amount of, you know, productive day. And productive doesn't need to necessarily be work. It could just be showing up to your family in a more energetic way to be more present with them such that you're able to, like I say deliver on your different roles, whether it's at work, with family, in a sports competition just for hobbies, right? But to be able to do that because you put aside that time to exercise, it's a very real benefit. So that's all. That's my contribution before we move on to the microbiome.

- Well, I think you make a really important point. And it kind of goes back to understanding why we're exercising. You know, we can talk so much about the what and the how. What do I need to do? How do I do it? When we talk about fitness and movement and exercise. But when we understand the why, then it becomes meaningful. Like Richard Branson understands the why, that this is really generating clarity, energy, focus for later in the day when he needs it most. And so, you know, I think hopefully people will walk away from this conversation that you and I are having with a greater why, for why they need to move. That this is not about losing weight, it's not about maintaining weight. It's not even about, you know, gaining more muscle mass. Really what you're doing is optimizing the entire system. Like you said, all the way down to the epigenome, which is that layer above our gene that is reactionary to the outward environment, including movement and deep breathing and food. And when we flip those switches on the epigenome, everything that flows down from that kind of that point like waterfalls, triggers a whole cascade of switches in our body that lead to greater energy production, a healthier microbiome, more mitochondria that are functioning more efficiently, decreased inflammation. And as we'll see other parts of the body, all get this positive cascade of benefits through this activity of movement. And it really is just

finding something we love to do and moving for an hour and we get this incredible enhancement to our life through movement.

- Yeah. I could riff on that for hours. I wanna go to the microbiome, but I'll just underscore the point you made, which is we're not talking about the gym. We're not necessarily even talking about 90 minutes a day every single day where you're sweating and your heart, you know like. 'Cause I know a lot of people have anxiety around that and probably some level of fear of commitment if you will. And that, you know, it's like they don't have the identity of someone who goes to the gym, right? And they don't want, you know, it's like that inertia, right? That blockage in terms of just starting. And so much of what you just described, so many of those benefits. Particularly for brain health that we're learning about more and more. And I'm certain that so many of the people watching this today are concerned about their brain health long term, right? And you can achieve so many of these benefits by just walking every day, right? Just movement. You know, gardening is the, you know, the favorite of anyone who's a fan of the blue zones philosophy. You know, these do not have to be high intensity exercises. Great to get your heart rate up, that's important. Resistance training, amazing, right? But like you can always start with something very, very low impact and reap some tremendous benefits and then build on that. So please tell us about the microbiome before I take up too much of this time.

- That's all right. I'm just gonna add to that one point that since we're on this topic, that it can be absolutely fun and you can do with other people. And one of the ways that I kind of reclaimed some time and connected with my children when they were younger is we would play tickle monster when I got home from work. So for 30 to 45 minutes I would chase them up the stairs, across, down the stairs, through the house. I would get an amazing cardiovascular workout. They got a great workout, we laughed together, we connected, and it was beautiful. And so, you know, we can kind of reframe movement and fitness into all kinds of meaningful connections with other people and activities that still give us the same benefit that we're talking about here.

- Yeah, that's wonderful. And I'm so happy you didn't say pickleball. You know, the low hanging fruit. When you said social and activity, I was like, all right, here's the first mention of pickleball, it's happening. I'm a fan. Anything that gets people out moving, you know?

- That's right.

- Hate to see us losing tennis courts, but you know, anything that gets people out moving I'm a fan of so.

- That's exactly right.

- All right, microbiome.

- So yeah, just very briefly on the microbiome and energetics of the body. And you know, this is a topic that we could talk about for weeks. But just to simplify, you know, it's this a hundred trillion bacteria that live in our gut that really are similar to the bacteria that live in the soil. And in fact, for most of human history, we recolonized our microbiome with soil organisms because we farmed in soil, we ate food from the soil, we live with animals. And so we had this constant kind of ecosystem similarity to the soil. But our microbiome is really essential to our health. It's essential to at least 75% of the function of our immune system. And as we dive even deeper into the microbiome, we learn that there's, you know, the gut-brain axis, there's the gut-liver, the gut-kidney. There's even a gut-joint axis where they're finding that the microbiome migrates to the joint and find its way into the joint. And the bacteria that live in your joint can maintain the health of your cartilage or degrade your cartilage. So in more ways than we probably understand, the microbiome is interrelated to our health. When we're talking about the energetics of the body, these are just two simple slides. I'll just highlight the points here that, you know, because of the lifestyle that we lead today, stress, processed food, antibiotic residues in our food, antibiotics from healthcare, we get this dysbiosis or disruption of the microbiome. But when we begin exercising, you know, we know the plant-based diet, and I'm sure you have lots of information on that on this program, but exercise actually begins transforming the microbiome as well. It changes the tight junctions. It changes the types of bacteria that live in the gut. It reduces inflammation. And through the relationship again, of the mitochondria, the mitochondria are circling back kind of in a cyclical nature with the health of the microbiome to support a healthier microbiome. And then when we get this naturally healthy microbiome, as we can see here in the left with the eubiosis. We get the production of all these secondary byproducts from the microbiome that do amazing things throughout the body, touching almost every part of our cellular activity, our DNA, our epigenome, stabilizing blood sugars, the short-chain fatty acids are wonderful. It increases antioxidant systems, reduces inflammation, decreases the body's insulin resistance by increasing the body's sensitivity to insulin throughout the cellular activities. And it just enhances the health. So it's not just through food and fiber that we enhance our microbiome, but by moving and being active, we can enhance this relationship with our microbiome. And then the secondary benefits of a healthy microbiome are vast as it's connected throughout the entire body, including the brain. Upregulating neurotransmitters that manage our mood. Interacting with our joints as I mentioned. Reducing key inflammatory mediators throughout the body. So this, the exercise that you do and the changes in the microbiome, really impact your health throughout your entire body. And part of that is this interaction with the brain, the gut-brain axis. And so through not only the microbiome, but through activity, and I had to include racket sports in there, Matt, because racket sports are maybe one of the best activities for the entire body, but especially for building the brain. But we know that physical activity increases this key growth factor called BDNF, brain-derived neurotrophic factor. And that's the one that is involved in rebuilding these connections inside of your brain. So with all kinds of movements, and the wilder the better, chasing balls across a court really enhances that, your body's formation of new connections, which maintains your cognition, maintains clarity and sharpness of your mind. We also know that through activity you increase endorphins and serotonin. And so both of those things go back to support mood, energy, mental clarity, engagement, motivation, and memory. And so through this

beautiful interaction of activities throughout the course of a day, playing racket sports with people, lifting in your gym, doing yoga, deep breathing, stretching, any of those activities are activating this BDNF and growth factors to rebuild and maintain connections. And one of the things that's really helpful is is varying your activities. So playing some racket sports, doing some running, doing some calisthenics, lifting weights, doing some yoga, deep breathing exercises, you know, functional fitness, all of those things create a variety of challenges. And then your body adapts to the challenges by building a better brain and increasing this neurogenesis or growth of blood vessels. And all of those contribute to feeling better on a daily basis. That's kind of what you're talking about with Richard Branson. Not only the energy, but the mental clarity that he has at the end of the day.

- Yeah. I think just to hop in there, you know, we all intuitively understand it because if you've ever spent a day sitting at the computer under, you know, halogen lights, right? Like it can really sap you of energy. Whereas a day, if you're blessed to be out and about, you know, socializing, playing sports, right, walking around and visiting a museum, right? You're not tired at the end of the day, right? It's energizing even though you may actually be expending much more energy during those activities as compared to just sitting down, you know, in a crumpled position at your computer. So I just think it's wonderful to point that out. For those who are short on time, I'm just curious, do you have any recommendations or is there any literature that you've seen that would suggest if someone doesn't have a day to go to museums and play pickleball and the things I just described because most of us work way too much in a chair in that hunched over position and so if you only have a half an hour, if you only have one hour three days a week, is there any literature out there in terms of maximizing, you know, the impact for your body, your brain, you know, your energy levels, whether it's resistance training or it's getting your heart rate up or it's racket sports? And if you're gonna get to it in the slides, by all mean feel free to just continue. But I'm just curious for those who are short on time, what's the best way to use it?

- The good news is that just doing small bouts of exercise five or 10 minute windows throughout the course of the day, you know, up to 30 minutes or 45 minutes, has the same impact on the body as doing a longer bout of exercise. And so we can weave into our day, even busy days, little bouts of exercise. You know, you can stand up and just do two minutes of fast high knees, you know, walking high knees, and that will get your heart rate going. I love to think, talk about redeem the time exercises. You know, if you're on the phone, you can do a wall sit or you can do a lunge. I love isometric exercises. You know, I do these on the airplane where you push and hold and just go through an entire workout with isometrics. You're in a doctor's office waiting for the doctors because they're always late, you can get an entire workout done in the waiting room with isometric. Parking at the end of a parking lot walking in, doing an extra loop up and down the stairs in your house. You know, it's doing some squats while you're on a long Zoom waiting for people to finish. I mean, there's lots of ways to weave in or redeem the time. And, you know, we can all squeeze things in. Yup, bands while you're sitting there on a long Zoom call. Exactly. I travel sometimes with bands, 'cause they're so easy to use in your hotel room. You can get a quick workout in your hotel room. And I think, you know, that's another mindset limitation that we

often place on ourselves is that I have to go somewhere to do exercise. In reality, we can do something anywhere, anytime. Hotel rooms, waiting rooms, at your house, while you're watching a movie. You can spend the first 30 minutes doing some squats, pushups, core stretching. You know, there's lots and lots of ways for us to do that. Even if you're gonna be on social media you might, you know, challenge yourself to do some wall sits while you're looking through the endless scroll bar. But there's that.

- Yeah. I think wall sits during a call I've not yet figured out. I've done kettlebell swings, I've done walks, I've done runs. In fact, I did 7 1/2 miles while on the phone today, which, you know, I'm very grateful for the people who allowed me to huff and puff as I was trying to also participate on the call. But you got to get it in and you have bands at the desk. I mean, to your point, you have that limitation where you think if I don't have 60 minutes to go really, you know, exert myself at the gym or whatever it might be, you know, there's so much you can do. I'm curious if I may ask one other question. So much of what we're talking about, in fact you're about to get there with enhanced blood flow. What literature exists? What have you seen as it relates to sauna or even a really hot bathtub? Two of my favorite activities. 'Cause you can really get your heart up, right, your heart rate up. You can really feel depleted. Like you just, you know, it was exertion. It was a form of activity but it's not active. In fact, it's probably the most passive thing you can do to get your heart rate up. You literally just sit there. How does that relate to all this? Can we count that as quote, unquote, you know, in the same category as as movement?

- Yeah, you know, there are benefits. Saunas and cold plunges, there are definitely physiologic benefits to those. I don't think they're in the same category as movement that we're talking about. You're not gonna get your heart rate up, you know, much more than probably 120 in those situations. But there is, you know, there's amplified blood flow after cold or hot exposure, vasodilation, nitric oxide production, hormonal improvements that come, reduced inflammation from both of those modalities. And so they're certainly beneficial. But unfortunately not, I don't think we can squeeze those in to the movement category.

- Probably not. Yeah, so we might,

- It still might help-

- we might put those into the, we might put those into the recovery category.

- Yes, that's right.

- You know, to, you know, we've got some very big muscles and they need to contract and stretch out and you got to move them. So, okay, great. No shortcuts as they say. Please continue. Let's talk cardiovascular.

- That's right. And this is a picture. I love this picture because this is the blood vessel framework of the human body. You know, we have 60,000 miles of blood vessels in our body, which carry blood and nutrients to the, you know, a hundred million cells that make us who we are. And those blood vessels are critically important for so many reasons. There's a little cell lining inside of the blood vessels and the cells that line the blood vessels are called endothelial cells. And they're kind of the barrier between what's in the blood and our cells. And exercise has a very positive effect on the endothelial cells. It enhances the activity of endothelial cells. They produce the molecule called nitric oxide, which allows the blood vessels to dilate, allowing for greater blood flow and oxygen transportation. But it also reduces inflammation and it reduces the stickiness inside of those blood vessels. So we're less likely to form plaques. And so, you know, when we're exercising or moving, blood is flowing through all of those channels, those highways to our cells. And with greater vasodilation, greater opening of those blood vessels, we get greater transportation of oxygen and nutrition. And in that way, even afterwards we have vasodilation, we have improved oxygenation of the body and the brain, which reduces fatigue and it boosts our energy levels. And you know, so it really has an incredible benefit. And then the heart obviously adapts to exercise, becomes more efficient at pumping, we get lower blood pressures, lower stress effects. And so, you know, the entire cardiovascular system also contributes to that feeling of feeling energized because blood is flowing through those nice wide open blood vessels.

- I want to cover nutrition 'cause that's one of your expertise and there'll be some questions there. But whenever you talk about vasodilation or constriction, I'm curious if you wanna make a comment on caffeine or salt or sodium. You know, both are great pools perhaps when used correctly as it relates to exercise, right? Today I lost a lot of electrolytes running in the midday sun for, you know, an hour and a half. I think electrolytes can be used as a replenishment. We also look at sodium and as it relates to, you know, hypertension. And, you know, sodium is very big in certain circles. Not so much in the more evidence-based plant-based circles, but there's a lot of people out there that are, you know, really pounding back sodium, salt, electrolytes type drinks, and caffeine. I'm curious your take, especially as it relates to the person like me who likes to have a little bit of caffeine before say, you know, a heavy resistance weight training type exercise. I'm curious how those things might relate as we think about activity, especially, you know, more intense activity for folks who, you know, are trying to push those limits.

- Yeah, so you know, sodium balance is really important. And a couple of of key things. Again, the body's ability to adapt, you know, with a plant-based diet and reducing our sodium exposure because, you know, really 80% of the excess sodium that most people are consuming today is from processed food. So it's not the salt shaker that's the big problem, it's the processed food. But even as we begin reducing sodium intake, our kidneys become more efficient at managing our sodium levels in our body. And you know, so that's really important that we, you know. And I say that because it doesn't, you know, we don't need to consume large amounts of salt if we're exercising. However, with exercise and drinking too much water, we can get ourselves into a bit of a problem called hyponatremia where we do have a low sodium level. And if the sodium level gets too low, actually the brain begins to swell and can be a life-threatening condition if your

sodium's down, you know, 120 or lower. So that's to say that yes, if we are sweating a lot, then you know, replacing some of that sodium with, you know, more sodium rich foods like celery, like, you know, some of the replacement drinks and actually coconut water as it has nice mineral balance that we can use, or green drinks that also contains some extra sodium. But those things, you know, will help make up for some of the losses especially for sweating. You know, the mistake that some people make is they sweat a lot, they drink water, but they don't replace any sodium. And over time that your sodium level can drift down. So yeah, it is important if you're a heavy sweater and you're working outside to be, you know, cognizant of that and replace some sodium either in your food or with some drinks. Like a seven mile run in the summer, I'm sure you lost a lot of electrolytes. And so it's probably beneficial to replace those. Caffeine's a bit of a mixed bag because some people are slow processors of caffeine just by their genetic makeup in their liver. And so caffeine can have a lot more detrimental effects for some people. They get the huge sympathetic response with increased heart rate. They can have arrhythmias. You know, it can cause some issues. But there are some people where the, you know, caffeine, they are rapid metabolizers of caffeine. And in those cases they can have the benefits of some of the antioxidants in coffee and they don't get all of the negative effects of the caffeine. There is evidence that taking some caffeine before a workout can enhance the effort and the gains. You know, 20, 30 minutes before a workout having some caffeine. Maybe the better form of caffeine would be like green tea than just a coffee. But yeah, there is some benefit. And you know, I always like to just tell people know yourself. You know, if you drink coffee and it jazzes your heart, you get a racing heart, you feel anxious, probably you shouldn't do that before a workout. If you're taking some caffeine in, you don't have any of the deleterious effects or the negative impact, and it enhances your workout, you're probably safe to do that. And then again, just you know not letting caffeine be a compensation for an unhealthy lifestyle like not getting enough sleep and not drinking caffeine at night to disrupt that, that sleep wake cycle.

- Yeah. Like, you know, to record a interview late at night after you've been up for a long time, that's what you don't wanna do. Yeah. Tell us about exercise and hormonal balance.

- Yeah, so, you know, our hormones are even balanced by our exercise as are, you know, as it is with food as well. We have this nice balance of endorphins that are released. This is the runner's high. And Matt, you know, I was a track athlete, I was a sprinter, and I did a lot of running and I ran even a half marathon distance, I never got the runner's high, so I'm not sure what it is. But when I sprint, I used a lot of endorphins. And so, you know, that's where my endorphins come in. But we all have had that experience with some kind of activity, you know, playing soccer, playing pickleball, a really robust yoga routine. But you get this boost of endorphins, which reduces the perception of pain and improves your mood. It does create a sense of wellbeing and vitality. It makes you feel more energized, but it also has benefit inside of the body with again, blood flow, vasodilation, oxygenation of tissues. And it leads to that prolonged effect of exercise giving us a greater sense of an energized vital body. At the same time, you know, when we're exercising, we have the benefit of reducing cortisol. Now cortisol is the stress hormone. It's released by the glands on top of our kidneys, the adrenal glands, in response to stress. And so we all have stress

in lots of different ways. Some of us have learned to manage it, internalize it. But anyway, when that cortisol rises, and if it rises and it stays in a elevated state for a prolonged period of time, it has a very negative impact on just about every single tissue in the body, including the microbiome and the mitochondria. So when we're exercising, your body is chewing up cortisol, it's basically removing it from the bloodstream. And as it does so, it decreases the impact of that cortisol throughout the body. So it improves again, the microbiome and the mitochondria, which lead to more efficient and greater energy production. You've protected the power plants of your body. And then finally with exercise, your kettlebells right there, Matt, that you've got in your office, you know, we have this boost of testosterone and growth hormone, especially when we're doing some leg exercises like this. We boost growth hormone. As growth hormone goes up, we again begin repairing tissue, regenerating tissue, and stabilizing and balancing our body in an anabolic state which is a rebuilding state. And that leads, again, to greater and more efficient energy production.

- Is it the fact that they, your muscles, your leg muscles that I think you just commented on are, you know, significantly larger than any other muscle, right? If you think about like bicep curls, right? Your glute is 10 times the size of your bicep for most normal people. Probably for anyone really. Is that the reason why there's a larger boost in testosterone? It's just a function of bigger muscle groups or bigger muscles and obviously very large muscles in that group. I'm just curious if you can elaborate on that as well.

- Yeah, part of it is the mass of the muscles. You know, the quadriceps and the glutes are the largest muscle groups in the body. And when we tax those muscle groups, we see the greater spike in growth hormone and testosterone. It's also the thing that people don't enjoy doing. Like leg day is not the fun one, right? But we don't miss that.

- I was like- My leg day is like today a very long run, which is not good. I recognize I always chastised myself that I need to not skip leg day, but anyway, it' isn't about gain.

- Well, an easy leg day is, you know, you got a bunch of phone calls you can do five or six wall sits for two to five minutes and that's a good leg day right there.

- Yeah. Well, as a sprinter and a bobsledder, I can only imagine what your glutes look like but.

- Used to look like, not anymore. But yeah.

- Fair enough.

- Few years ago.

- My kids wondered why the sprinters were so muscular, right? You know, and that's a, you know, anyway. Sleep, tell us about sleep.

- Well this is one of the underappreciated elements of lifestyle that we cheat on all too often. It's important for recovery. It's important for regeneration. And with physical activity, there's an amazing relationship between sleep and our physical activity. So when we're more active, when we're working into consistent exercise routines, we enhance the quality of our sleep. The studies show that we fall asleep faster, we get to deeper sleep quicker, and we actually get into those nice deep regenerative restorative deep sleep cycles that allow our body to regenerate itself. There's also a regulation of the circadian rhythm that begins regulating our internal clock. And so our sleep wake cycles become more consistent and all of those things lead to greater energy production and efficiency. And you know, just at the basic level if we're talking about energy, when you don't sleep, you wake up, you're tired. And so at the core level of just feeling energized every day, a good night's sleep is essential.

- I think we all need to remember, myself most of all.

- Yeah and you know, it's really like the basics of sleep are that we should go to bed between 10 and 11 and wake up somewhere around five or six. And you know, there's a regenerative window at night that happens between 12 and 3:30. And so if we push too far into the night, we miss that regenerative window. That's when our body is repairing tissue, when it's reducing inflammatory effects, when it's rebuilding our brain, solidifying memories, all of those things are happening that window overnight. And exercise or more movement and activity help us get more wired into that perfect sleep window so that we can reap the benefits of not only the physical regeneration that's happening, but also the benefit of just a normal healthy sleep wake cycle. When you wake up in the morning and you feel ready for the day.

- So 10 or 11 to five to six to maximize the 12 to three. I'm curious to hear your take on this. I always joke, half joke, that anyone who complains about sleep challenges, not withstanding some very significant challenges that someone might experience, but if you wake up at 4:45, 5:00 on the dot, my best tip for folks who wants to train their bodies to do so is put your alarm clock in your bathroom, right? Move your phone charge in the bathroom, you have to get up to turn off that alarm and you just have to have 10 seconds of discipline to not get back in bed, right? It's like that old story of like, all you need is like 10 seconds of tremendous amounts of courage to change your life, right? It's that in the morning. You know, like just don't get back in bed. If you do that, that night you'll be exhausted, 'cause you got up at 5:00 AM and then you can go and add on to that with the whole, you know, exposure to that low level light when the sun is rising. It's a beautiful moment. The world is quiet, you can really get a lot of work done. I love those early mornings. But truly starting your day early is one of the greatest ways to end up going to bed early. Which then brings me to point number two for anyone who's looking for the behavior change. To me, you know, I actually set my alarm for the evening. It goes off at 9:00 PM. And because I've really found like the keystone habit, the habit that changes habits downstream is really going to bed earlier. 'Cause you know, then when you wake up, well frankly, then you can wake up at 5:00, 5:30, 6:00 AM which again starts that cycle so that your circadian rhythm is kind

of aligned with the sunrise sunset. And you'll fall asleep naturally at 9:00, 9:30, 10:00, which once again not to be, you know, too repetitive. But by going to bed at that 9:00 to 10:00 window, you feel better waking up the morning and it's just this virtuous cycle. I think it's so funny, I mean I won't say names, but I once saw someone who was being a sleep doctor, I think he was on some sort of sleep medication and I witnessed him consume alcohol, consume caffeine, and even smoke a cigarette at dinner, right? Now granted, you know, it was a family event, it was maybe a vacation, let's not judge him. But come on, like if you wanna mess up your sleep, then do all those things. So much of this can be boiled down to really simple behaviors. And for me, time and again I'm reminded that like if you're up until midnight, there's no way you're gonna get up at five or six in the morning. If you're sleeping until seven or eight and your whole clock, right, is now attune to and adjusted for going to bed 10, 11, probably closer to 11 or 12, right? And thus, you can't wake up in the morning. So I really encourage people, if you want to fix your sleep, just get up really early a couple days in a row, reset that clock and it will be life changing. So thank you for coming to my TED talk. Let's get back to physical activity and muscles.

- Well that's really valuable information that you gave because you're actually just working with your body. You know, your cortisol levels begin rising like, you know, somewhere around 5:00 AM. And so that's helping get your body up, increasing your blood pressure. And so you're actually working with your body to enter the day. If you oversleep, you always wake up tired, 'cause you go back into some REM sleep and it takes an hour after you wake up to get yourself kind of right it again and figure out which direction is up. So that early mornings

- Yeah.

- and that schedule that we have been wired to the sun and we cannot get out of that is the best way to generate healthy energetic days by just getting yourself on a good sleep schedule. And some of it is

- I mean-

- actually just turning these, right? Putting these away.

- Yeah.

- And getting to bed.

- Tip number two, don't open Instagram at 10:00 at night.

- Oh.

- Guarantees to mess up your sleep, right? For any number of reasons.

- Hours gone just like that.

- Yeah, it's number one thing. The other benefit of sleeping with your phone, charging in the bathroom, not only does it make you get up out of bed, but also diminishes a chance that you mindlessly scroll instead of sleeping. Let me quickly comment on one thing which is, I'm so glad you mentioned that cortisol cycle because I've experienced that time and again when I've woken up maybe because I have to go to the bathroom or whatever it might be at 4:30 in the morning and I'm like alert, I'm awake, you know, for whatever reason that I'm ready to go. And then there's this other times when for whatever reason I wake up at 6:30, right? Maybe I sit up late and I might have gotten, you know, on an absolute basis more sleep, but I'm exhausted, right? And it's so funny because it really is about understanding your body and getting those rhythms right. And like I say, setting my alarm at 9:00 at night, which is gonna go off shortly, has been a game changer for me. 'Cause to me it's not about when your alarm goes off to when you wake up, it's about reminding you now's the time to start shutting down, start winding down, lowering the lights, you know, trying to really get into that good sleep hygiene routine. I'm really curious and I know we're almost out of time and you're staying up late for us, so I'll hopefully make this brief. But there is a lot of attention paid to that cortisol cycle. And I'm curious if you have a comment on drinking caffeine within the first 45 minutes of when you wake up. Because there are some notable folks in the scientific community these days that suggest that that caffeine impacts your adenosine receptors and thus messes up your cortisol cycle such that you don't get the natural expression. And by say 1:00 to 4:00 PM you actually feel that crash. And I've tried both ways. I gotta tell you I've got way too much stuff going on in my life to, you know, there's too many conflating variables for me to really say if I notice one way or the other. But I am curious if you think that people should stay away from the caffeine in that first 45 minutes to allow for that full expression of the cortisol cycle.

- I mean, again, you know, living in that kind of synchronicity or harmony with the rhythms of our body, it does appear there's benefit to not drink coffee in the first 45 minutes to an hour. And if you're gonna have your caffeine, coffee, have it a little bit later. It's also, you know, when you do that, you break the mindset that I'm dependent upon coffee to get up and get going in the morning. Which is really free. You know, to get a good night's sleep And if you wanna enjoy your coffee, you just do it an hour, two hours after you've been up. And so you flow into the day, you let your body get awakened, you do some deep breathing, some meditation, some prayer. You organize your life and then you kind of move in. And I really have found that that's, in my own life that's what I do too. I don't necessarily have anything right away. And I do think that

- Yeah.

- that impact on that adenosine receptor and that also comes to play later in the evening if you have caffeine later in the day, it does impact the adenosine receptor. And that can cause some disruption in your deep sleep cycles too.

- Yeah. Yeah, I have found a great hack, sort of most, like they talk about habit stacking, right? And meditation is a great way to stay away. 'Cause you don't wanna drink a cup of coffee or for in my case tea right before you meditate. Not a good way to quiet the mind, you know? And so there's sort of a natural, whatever you wanna call it, a limiting factor in that if you wake up, you know, you go straight into the meditation cushion, You know, generally it takes you, whatever it is, five, 10 minutes to walk over there, meditate for 20, 30 minutes and you naturally build in that cushion so that when you open your eyes again, you feel alert, you're naturally awake. And to your point, Ben, you know, you're not just sort of, which I've done chugging a cup of tea, you know, in order to like, you know, get your eyes not to sting 'cause you, you know, clearly not tapped into your natural rhythm. So anyway, sleep is so important. I'm glad that we were able to spend a little bit of time. Hopefully some of these behavioral tactics are employed by the folks listening.

- Yeah, that sleep is so important. Recovery, regeneration, health, brain health, you know. It's getting that piece wired can change everything. So I'm glad we spent some time on that. So I just-

- Tell us about physical activity and muscle.

- Yeah, briefly here. Physical activity and muscle. It seems obvious, right? We're physically active, we build muscle. But one of the things that has been in the literature as we age, we develop sarcopenia, which is really like it's loss of muscle, muscle atrophy, but also loss of muscle contractility. And what's interesting when they look at the types of fiber, muscle fibers that are most affected by sarcopenia, it's the fast twitch muscle fibers type 2. And so part of it is maybe aging, but more than likely, right, this is related to just a lack of activities that are challenging fast twitch muscle fibers. You know, it's natural as we age that we're not doing the things that we did when we were younger. You know, running, sprinting up hills, chasing children up and down stairs where we're activating those fast twitch muscle fibers. And so, you know, the old adage is if you don't use it, you lose it. And that's exactly true with these fast twitch muscle fibers. But this comes in to play with two things. One, fast twitch muscle fibers are really essential for helping prevent falls. You catch your toe and you plant your foot, the fibers that are going to prevent that fall are the fast twitch fibers that contract quickly to stabilize that leg before your center of gravity goes over your knee. And so if you only have slow twitch muscle fibers, your muscle fibers are slowly contracting, but your center of gravity gets over your knee and you fall. But those fast twitch muscle fibers also give a perception of energy and capability, you know, to be able to step things, to catch ourselves, to up and down stairs. There's a sense of of being capable and able to do things that comes when we have fast twitch muscle fibers. So the best way to do that is we just train them. And when we begin training muscle, they have found in really interesting studies where they took very debilitated elderly people in a nursing home and they put them on heavy three rep max lifting programs, which I don't know how they got through that IRB, Matt, but you know, put somebody on a walker and a heavy squat rack and having them doing three sets of three reps of squats. But what they found when they challenged these people, that their muscles responded just like somebody in their 40s. They built fast twitch muscle fibers. Their muscles

hypertrophied and got bigger, they got stronger. And so sarcopenia is not so much a disease of aging, but rather probably inactivity. And they also found in these muscles, and again this goes back to the powerhouses of the cell. With sarcopenia, there's a real disruption in mitochondria. We lose mitochondria and the mitochondria that we do have become very inefficient. So there's this sense of like not having a lot of energy. The legs feel totally flat. But again with training, even training in elderly people, they were able to rebuild those mitochondrial densities inside of their muscle with more mitochondria and more efficient mitochondria. Their body has responded, they adapted to that exercise bout in a very meaningful way that generated more energy throughout the entire body. And then there are the other benefits that we know coming from activity. You know, the metabolic activity ramps up. It's easier to maintain a healthy body weight. Just losing fat on our body releases a whole bunch of inflammatory mediators and disruptors of hormones. You know, it's very interesting in fat, there's aromatase enzyme that converts testosterone into estrogen. So as we get a healthier body weight, we balance our hormones. Again, getting more normal testosterone levels. And then the confidence and fall prevention that we talked about. And so all of this, you know, again, this goes why do we move? Why are we finding activities that we love to do? It's because it gives us a more joyful life. When we're energized, when we're feeling alive, when we have strong muscles and a strong brain, we get to interact in life in more meaningful ways. When we have energy, we are present for people. We are present to share our gift. We have opportunities that would not be available to us were we not living in a healthier body. The movement translates into energy, which translates into a meaningful, wonderful, joyful life. And you know, hopefully you've been able to just be inspired a little bit as we took a just a bit of a deep dive into the incredible activities that are augmented, improved and optimized through daily activities. And so thank you.

- Awesome.

- And we can jump in on a conversation. I'll stop my screen share now.

- Yeah, thank you. And you put up Plantrician. I hope people will Google Plantrician and there's many ways for folks to get involved, obviously that mission, that orientation, to educate doctors and other healthcare practitioners to share this message out is so important. But for those listening who aren't in the the medical field, you can still sign up and join the tens of thousands of folks who subscribed to your journal and learn with you. So I hope people will check it out. That was a fairly comprehensive presentation on the energy equation, which you just described so perfectly. Movement translates to energy, translates to a more joyful life, more capacity to give, to be present, to enjoy this amazing experience that we have. I'm curious because, you know, you can't have a conversation with a plant-based talk without asking about protein. You just, you got to ask about proteins.

- Right.

- It's a thing, you know? So I'm just really, quickly two things that we didn't touch on. 'Cause I had this system of questions and you hit all of them so beautifully in that presentation. But I really am curious, you know, tied to nutrition, a lot of people think about protein recovery. Those amino acids are the building blocks that allow us to, you know, literally rebuild muscle tissue as it's torn and used and then obviously strengthened through that process. Tie it all together for us relative to plant-based nutrition. Can you do it on a, you know, a plant-based diet? I think we all know the answer. But educate us to why and how do we optimize and what are some of your recommendations relative to protein in particular?

- Yeah, yeah. So just quickly on that, you know. Protein, the word means of prime importance. And so protein is critically important for our bodies. You know, when they made those recommendations of .8 grams per kilogram of body weight for most adults, you know, 1.2 to 1.6 for athletes and maybe a little higher, you know, 1.2 for people over 65 because of protein simulation, they also added in a kind of a safety factor of about 30%. So even those numbers, you know, if you're even close to those numbers, you're getting more than enough protein. Generally when they've looked at protein consumption in people with plant-based diets, they're getting up to 70% more protein than they need. In America, the average person's getting more than 100% of the protein they actually need. And the challenge comes in is the way that the proteins packaged. So protein is 20 amino acids. And all plants have all 20 amino acids, essential and non-essential amino acids. They have them in lesser amounts in some plants. But when you eat a variety of plants, you get all of the essential amino acids that your body needs to create proteins and structures in your body. Animal proteins have more of those essential amino acids. That's why they were initially considered to be, you know, the more complete protein or you know, we always heard that the egg is nature's greatest food because it has all the essential amino acids, but it also comes with a lot of other things that are not beneficial. So I like to think about protein as, you know, we're getting amino acids from plants or animals, but really what matters is the way that the protein is packaged. And we know that animal protein comes packaged with a lot of inflammatory mediators, saturated fat, kinin iron, Neu5Gc, endotoxins. The way that we cook it creates inflammatory mediators. Plant protein comes packaged with all kinds of anti-inflammatory phytochemicals and antioxidants, minerals, vitamins, and fiber. In fact, the greatest deficiency, nutritional deficiency in America today is not protein, it's actually fiber with only 4% of any age group getting the basic amount of fiber, which is 25 to 35 grams. And really for ideal health, we should be at 70 to 100 grams of fiber. So if we're looking to animal protein to get our protein source, we're getting zero fiber, we're getting cholesterol saturated fat, and all even inflammatory mediators. When we get plant protein, we get, you know, 30 grams of fiber. In 500 calories, you can get 30 grams of protein, antioxidants, phytochemicals, which have this vast array of benefit in the body touching every one of those systems and more that we talked about tonight. Vitamins and minerals that are involved in those 37,000 billion billion chemical reactions that are occurring every second in our body. And satisfying our need for these 90 essential nutrients that we need on a daily basis. And so it's just the way that the protein is packaged. But from plants eating sufficient number of calories, you can get sufficient protein. I'll just finish with this one really enlighten, study where they took 500 calories of animal protein and compared it to 500 calories

of plant protein. And if you go down to the line of protein, the animal protein was 34 grams, the plant protein was 33 grams. And so equal amounts of protein. We go down to the calcium line, calcium in the animal protein and this 500 calories included dairy, it was only 252 milligrams of calcium. In the plant protein, we had 500 milligrams of calcium. This was, you know, peas, tomatoes, cucumbers, and basically a salad. And so you're getting, you know, everything that you need and more when you're eating plants.

- Yeah. And not getting some very key, you know?

- Yeah, exactly that's right.

- kind of scary thing. So probably,

- That's right.

- Get what you need and stay away from some of those things that you don't. So wonderful. I really appreciate the time. Thank you so much for sharing your wisdom and putting together such a beautiful presentation for us. Again, just to tie it back to, the main message here I hope people take away is that movement doesn't have to be scary and difficult and painful. You know, it could be as easy as sitting at your desk, which, you know, maybe to prove a point, I should have been here all day but or all evenings, I'm talking to you but wouldn't wanna distract. And as you said, you know, movement leads to energy, which leads to a more joyful life, more of a capacity to be present, to show up, to give back. And I think you put it so beautifully. So thank you again. I really appreciate the time this evening.

- Oh, thanks Matt. It's been such an honor and I'm so happy to be a part of this. And you know, I think we're gonna share a quick start guide from Plantrician Project for everyone. And then I'll also, I have a great little guide on redeem the time isometric exercises. So I'll put that together and share that with you and make that available to everyone.

- Awesome. Thanks so much again, really appreciate it.

- All right, thanks Matt.