High-Intensity Training and Its Health Advantages:
A Special Interview with Dr. Doug McGuff

By Dr. Joseph Mercola

JM: Dr. Joseph Mercola

MG: Doug McGuff

DM: Many new studies support the importance of high-intensity training to improve your health. Now there’s even additional new research about myokines and how they can combat cancer and metabolic syndrome. Hi, this is Dr. Mercola, helping you take control of your health. Today we are joined by Dr. Doug McGuff, who is an expert in high-intensity training as applied to strength training. He has been very popular in our previous interview and has enlightened many people in this area as a leader in this type of research in high-intensity strength training. Welcome and thank you for joining us today.

MG: Dr. Mercola, thanks for having me.

DM: Now, you’re trained as an emergency room (ER) physician. But that’s not really your passion.

MG: That’s correct.

DM: Why don’t you tell us a little about your journey first and then we can go into a little bit of how you got into the strength training and then tangent over there into this new research.

MG: Sure. My passion for exercise and strength-training definitely came first. That started when I was a teenager about age 14 or 15. I had started lifting weights as a mechanism of improving my performance in a sport.

DM: Is that motocross?

MG: That was bicycle motocross. That’s actually now become an Olympic sports. That’s become much more popular than when I did it. But it really improved my performance. This was the same time when the Nautilus gyms were springing off around the country. I traded janitorial services for a membership there and came across a training bulletin written by Arthur Jones and read it cover to cover. That was it. That’s what sparked my interest in medicine and drove me kind of down that pathway just because of my curiosity of how the body worked. Emergency medicine turned out to be my passion within medicine. But exercise has always been the primary interest.

DM: That’s interesting. That was really one of the things that catapulted me to medicine, too – it was my interest in exercise and commitment to applying that as a therapeutic modality. However, I kind of…

MG: Yeah, it’s kind of ironic. There’s not one shred of that in the medical school.

DM: Yeah. The most obvious application would be the treatment of diabetes and obesity. But it’s just… The treatment model is just really not there. It’s just so thoughtless, especially as a graduate coming out, a fresh graduate with lots of debt to find a job that’s going to employ you in that model.

MG: Yeah.
DM: But we all have to earn our living. So, you went from there, and you got your strength training. How did you evolve in the high-intensity work? Maybe you can first distinguish the high-intensity strength training, how that differs from regular strength training, and how it compares to high-intensity cardio that people do like interval training.

MG: Okay. Well, the high-intensity strength training, that was first introduced to me when I was working out at that Nautilus gym as a teenager in Arthur Jones’ bulletin. What distinguishes it from regular weight-lifting is it is a process where you are trying to generate a stimulus to cause strength and metabolic improvements as opposed to simply trying to demonstrate strength by lifting the weight by any means possible.

What you’re doing is you’re actually using a style of performance that makes the exercise very, very hard. It produces a very rapid rate and depth of fatigue, which is the end-goal of what you’re doing with that kind of exercise. You’re lifting and lowering the weight very slowly in a way that deprives you of all momentum and in a way that fatigues the muscle deeply and quickly. It’s a very profound exercise experience for anyone when you first try it. But it is definitely something that triggers all of the desirable outcomes from exercise.

DM: You are way out of the curve, because that was… How many years ago now? Three decades?

MG: Oh, yeah. That was in 1975 and 1976 or 1977.

DM: Yes, 4 decades.

MG: I hope not.

DM: I know. Well, it’s better than the alternative – six feet under.

MG: Yeah, that’s true.

DM: It’s interesting now because really the bulk of… That was just shortly after aerobics. I think at that time, many people may not realize exercise was not a popular modality in medicine. It just wasn’t; it is now. You go outside and see people exercising all the time up and down the streets. That wasn’t occurring 40 years ago.

MG: Right.

DM: And any interest really in exercise was really focused on cardio aerobics, not high-intensity training, unless you were competing in some high-level sports and doing interval training. You were way ahead of the curve. Not only were you exercising but you were exercising this high-intensity. It was never cut off for 40 years or at least 30 or 35.

MG: Yeah. It was a hard thing to do at the time because Kenneth Cooper, aerobics, and all of that were so enormously popular. It was popular to the extent that other forms of exercise were actually viewed as bad, as bad for your cardiovascular system and had a negative effect, because it was sort of the antithesis of what was popular at the time. It was kind of hard to stick by your guns, but there was always… This was where myokines finally bring it all together for me.

There was always this cognitive dissonance going on because it just didn’t pass the sniff test. When I went in a gym, all the really fit, lean, and healthy-looking people were lifting weights, and all the fat, sickly-looking people were on the treadmills. You kind of wonder, well, is this just a selection bias? The healthier and fitter people gravitate towards the weights. But there was just too much of it to ignore. There was something to it, and it turned out that there was.
DM: For the most part, that hasn’t changed. Obviously, there are some exceptions. You’re going to find really fit people on the cardio rhythm. But that’s unusual. Typically, it’s just the way you described 40 years later.

MG: Yeah. I love going to the big, big gyms. They have an escalator that goes up so you get on the stair stepper. That’s one thing.

DM: That’s always good. We resonate in so many levels because, as I said, that’s one of my passions. Really one of the motivating reasons that brought me to medical school was my passion for exercise. Well, why don’t you… For more details of this… I mean, you may go into this interview. But we did a pretty comprehensive interview previously. There will be a link for that on this page if you want more details of how to do this and the specifics. You’ve done a very good job previously with that. Why don’t you update us about this new endocrine signaling issue that your new research has been aware of involving myokines’ ability to combat cancer?

MG: For the longest time, exercise affects our own body composition. Health has always been attributed to simply sort of a “calories in, calories out” kind of paradigm. Again, it’s never really passed the sniff test for me because what I was seeing when I would look around at people at the gym is that just simply didn’t add up. The people who seem to try to use exercise for a calorie burning effect seem to be the ones that got the worst results from it. That’s always been rattling around my head.

And then about a decade ago, Art De Vany… He’s a popular blogger in the exercise and diet world. He’s actually an economist. He made a comment that all of the tissues in your body are, to some extent, based on your behavior, your diet, and your lifestyle. They’re in competition with each other. How you organize your lifestyle determines who gets the competitive advantage. It’s always used to be thought that the entire body was this homeostatic organism that automatically trended toward optimal health. That’s not actually the case.

That really resonated with me that there was this interplay and a competition between muscle and fat and all the tissues of the body. That was just one of those things that really felt like this is something I believe we cannot prove. But then the status started to come out about myokines. What myokines are: it’s a type of a chemical messenger in a class called cytokines.

A lot of cytokines were known about that were liberated from adipose tissue, body fat, particularly the truncal fat mass that makes you the apple shape and the intra-abdominal fat. It was particularly oriented towards producing inflammatory cytokines – Tumor necrosis factor alpha (TNF-alpha) and interleukin-1 family (IL-1). All of these were involved in inflammatory and disease states and were cytokines that were known to be elevated in people that developed cancer. This was all very bad stuff.

Starting around 2003, they started to make the realization that muscle was also an active endocrine organ. It produced cytokines of its own, which they ended up terming myokines. What we found was these myokines, there are several different ones. We can discuss them each individually as we go here. But in general, they are very anti-inflammatory and they pretty much produce all of the effects that are the antiphysis of the metabolic syndrome.

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They increase your insulin sensitivity. They increase your glucose fuelization inside the muscle. They increase liberation of fat from adipose cells and the burning of the fat within the skeletal muscle. They also act as chemical messengers that inhibit the release and the effect of the inflammatory cytokines that are produced by body fat. They also significantly, via inhibitory effect, reduce body fat irrespective of calorie intake. It actually has a fat-reducing effect that exists outside of energy balance. They have very profound effects.
They discovered several different ones that work by different mechanisms. It’s finally brought it all home for me and closed that cognitive dissonance of how is this actually happening. I see it, but I can’t prove it. But now we can.

**DM:** Yeah, and actually we’ve seen it for quite some time. I remember an article published at least as far back as the ’80s and maybe even previous to that, one of the researches coming out of aerobics institute with Ken Cooper, showing how exercise reduces the risk of cancer. It makes no sense if you look at it. This doesn’t… It’s not intuitive. Why it would do that, other than being healthy? But it appears that it has some very profound metabolic effects.

**MG:** Right. And I’ve always had a sense of, you know. In my book, *Body By Science*, my co-author and I, we decided we’ll try to define health in our own terms. One of the best ways I could describe it is there’s an appropriate balance between the catabolic and anabolic state. There has to be a balance in the body. That’s what this interplay between anti-inflammatory myokines produced by muscle and inflammatory cytokines produced by body fat and other tissues. There is a critical balance there that’s important. When that balance gets disrupted by changes in lifestyle that are not congruent with our evolutionary background, that’s when disease starts to happen.

**DM:** Yes, indeed. Maybe you can talk a little bit, too, about the… It’s not all exercise, which is actually one of the reasons I made the transition from exercise as my primary focus to nutrition, because the more I got into it, the more I realized that exercise is actually a relatively small component of being healthy. If you’re eating loads of processed foods and having the ideal exercise – yeah, it’s better than not exercising. But really, the bulk of how you’re going to stay healthy is by the foods you choose to eat or choose to avoid.

**MG:** That’s correct. That’s one of the major ways in which you can give the wrong tissue the competitive advantage. When you start introducing inflammatory food stuff, the metabolic pathways go through these cascades that generate these cytokines. One of my favorite phrases is you cannot, no matter how hard you try, exercise your way out of a bad diet. It’s simply because if you provide the wrong substrate that generate these inflammatory cytokines, no amount of exercise can outcompete that. You can’t produce enough myokines to outcompete if you’re eating a lot of refined carbohydrates, processed seed oils, and things that have such an inflammatory effect.

**DM:** Yes, indeed. Now, this term “myokines,” is this a relatively new name? Because I don’t recall hearing about it before.

**MG:** Around 2003 to 2005, when they were really starting to catch on to the first and probably the most well-researched myokine. It was one called interleukin-6 (IL-6). They knew it was cytokine, but they knew that it was specifically released by a contracting muscle. “Myo” is just a Latin root for muscles. They just termed the entire category of cytokines that were produced through exercise and contractions in skeletal muscle. They took that whole class and just renamed it myokines.

**DM:** Are these hormones actually can be measured in your office, like in the emergency room, or you can order from someone? Or is this mostly a research study?

**MG:** No. This is a research tool right now. I don’t know of any clinical use of investigating those myokines right now.

**DM:** The primary benefit of knowing this information is it provides a scientific rationale or explanation to support the implementation of this type of training program.

**MG:** Correct. I mean, things that you and I have known intuitively for a couple of decades now. But when someone pressed us to supply scientific literature to support that notion, we would just kind of have
to shrug. I’ve always been a guy that’s more than happy to say something goes in the black box on one side and a given result that’s beneficial comes out on the other side. I don’t really have to know or hear about what’s going on inside the black box.

But in order to take things into a public health level, a lot of times people in the health community in general has to have some sort of knowledge of what’s going on inside the black box. That’s what this does. This allows us to say in a nutshell, “See, I told you so.” To take this to a level where exercise and diet that is proper can be recommended as a public health initiative for something that’s really going to make a change in a widespread population.

**DM:** Really one of the major challenges of operating in the current medical system is that they are almost mandated to require the scientific proof. Many times – not in this case I believe – it’s proof that’s required in direct conflict with serious financial and economic incentives.

**MG:** Right.

**DM:** Even if the studies get done and published, they’re buried or suppressed and more frequently not even published, because they violated the current standard of care. Even though intuitively and traditionally, it’s been done for centuries or longer, they’re just not implemented.

**MG:** Yeah. Medicine is becoming more and more protocolized. But what happens is that when a protocol has government backing it, it’s very hard to introduce new evidence to change this protocol. Furthermore, one of the things is that financial bias always introduces the problem of you’re not really hypothesis-testing; you’re just trying to prove something that you can sell. But in the process of doing so, there becomes a big, big emphasis on turning out studies that have positive results.

And really, in my opinion, experience teaches us that the best knowledge that we can gain is from studies that we do that have negative results, no outcome, or disprove the hypothesis, yet only the studies that have positive results or that have proven the hypothesis tend to get published. Whereas you really have to dig to find out the data of negative studies and studies that disprove the hypothesis. That’s where so much good knowledge is that we will never know about.

**DM:** I couldn’t agree more. I’m wondering, because of your expertise in this area of health, what your impression is at the percentage of the population that is currently engaged in high-intensity exercise training, just generally, not differentiating between the 2 types, the 2 primary types. Would you believe it’s greater than 75 or less than 25 percent, less than 10 percent, or less than 5? How many people are doing it? Because my impression is that… I think it’s over 90 percent. I think most people just… They’re exercising and they’re doing traditional cardio or some other ridiculous thing that’s not going to provide these myokine benefits.

**MG:** Are you asking me what percentage of people do I think is doing high-intensity exercise?

**DM:** Yes.

**MG:** Oh, probably less than 2 percent, I would think.

**DM:** Less than 2 percent. Okay.

**MG:** Probably.

**DM:** My guess is less than 90. That’s good to hear your perspective. I’m at safe territory with 90.

**MG:** Yes.
DM: I’ve got a lot of buffer capacity because at some point, people will catch up. But I think that’s one of my missions. One of my missions is to educate people about the truth as it relates to health. It’s just so sad to see such large numbers of people investing massive amounts of time, effort, and energy and not getting the benefits they could just by doing it in a different way.

MG: Correct. I wanted to be careful, though. I mean, I’m a big advocate of high-intensity exercise, but I try to be very careful not to be elitist about it. Because one thing that is coming out of this myokine research is that something is always better than nothing.

DM: Right.

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MG: If I can get someone to do something and then use that as a platform to get to what I think is best, I think I’ve come a lot longer way than acting as if, “Look, if all you’re doing is this, you’re not doing anything. Just give up.” I don’t want to do that. But I do want people to understand that we evolved doing hard work. We evolved doing very high-intensity things not very frequently, not for very long because you can’t. But that’s part of our genotype. One thing that really becomes evident with me training clients over the years is that I think hidden inside of our skeletal muscles is what I call the active genotype.

Once you get a certain amount of strength and metabolic capability built into a person, once you trigger that certain level of improvement, all of a sudden, their spontaneous activity level goes through the roof. We call that NEAT, non-exercise activity thermogenesis. You hear all this talk about walking 10,000 steps a day, and that’s great. But I think they’re getting the cart in front of a horse with that notion.

Those 10,000 steps matter if they occur spontaneously as an expression of you having the appropriate degree of muscle strength and metabolic condition. You can’t just hold the gun to someone’s head, make them march 10,000 steps a day, and say, “Oh, now, you’ve got the health benefits of that kind of activity.” Actually, the spontaneous increase in activity that occurs as a result of appropriate muscular conditioning is where all those health benefits are derived from in my opinion.

DM: Well, that brings up another good point in an area I’d like to discuss with you, which has come into my attention since our last discussion. That is the fact that you can be super fit. Now, in your approach, you’re not exercising very frequently. It’s typically about once a week.

The challenge with this even with the people exercising every day, even if you are super fit, a competitive athlete, a professional athlete, a gold medalist, if you’re sitting down 8, 10, 12, 14 hours a day, the studies are pretty clear just like they were clear 20 or 30 years ago with exercise and cancer, that you are going to have increased mortality. There’s just no question about it. It’s incontrovertible evidence. I’m wondering what your take is on that and how you integrate that into your exercise recommendations.

MG: Well, it’s true. That largely has to do with we are so incongruent with our evolutionary past in terms of our activity levels, and it’s getting worse. Part of it is just immobility is bad. I worked in the ER last night. We had a lady from a car accident coming on a backboard. We have a huge push to make certain that we get people off of the backboard in less than 45 minutes, because beyond that, they actually start to get ischemic areas where they are contacting the board and they are already starting to set up muscle and joint stiffness that can be debilitating in the days and weeks to follow. We’re just finding that now through research.

Immobility is a bad thing. We evolved as an animal that was in constant activity but in a low level and low intensity with intermittent episodes of very high-intensity work. That is our evolutionary past. Doing the high-intensity exercise is important. I found that once you get to a certain level of muscle conditioning that your activity levels spontaneously rise.
But if you work in an occupation that forces you to be sitting all the time, if you find that you’re prone to do so, or if you’re texting all the time, whatever position you’re in chronically, it tends to become a position that’s going to limit your functionality and your range of motion. But as you’re going to develop a static posture that tries to maintain that position, people that are sitting and head down typing all the time are going to have a flat-chin posture that’s very unhealthy and very non-functional.

**DM:** One of the strategies that I’m recommending to people is to… Because there’s a number of people that are in this position in their life primarily because of the advent of the computer, which has a lot of benefits but the downside is you’re sitting down too much. I would say the majority of people watching this are sitting down far too much. I recommend they download a free software timer, set it for 15 minutes, and every time you’re sitting down, have it go off and get up. Physically stand up. Stand up the right way – because there’s a right and wrong way to stand up – and then do some type of movement.

**MG:** Right.

**DM:** Because once you’re focused and concentrated, it’s so easy to sit down for 2 to 3 hours and not even have second thought about it. It requires this intervention if you’re going to engage in a potentially dangerous behavior, which I believe sitting is. In fact, I interviewed Dr. Joan Vernikos. She wrote the book *Sitting Kills, Moving Heals.* I don’t think that’s a hyperbole. I think it really is true. That’s the strategy I’ve developed. There are hundreds if not thousands of tens of thousands of exercise you can do in those 30 seconds to 60 seconds that you stand up.

**MG:** Yeah. I mean, our technology is wonderful and it’s helped us a lot. But like any technology, it can turn on us and be our enemy. The other day, I was in a restaurant with my kids. It’s like a Chipotle restaurant where they have a buffet line you kind of go and do your order. All these college students were standing in line together. We were looking at them from the side, and they had what they call text neck. I don’t know if you’ve seen this. But a lot of young people that have grown up with their head down looking at their [cellphone] texting, [playing] videogames, and whatnot, their heads are actually coming off of their body at an angle sort of like a giraffe.

I mean, they actually have a permanent flexion contracture in their neck, almost as if they had ankylosing spondylitis or arthritis. That is their normal resting posture. They have a Dowager's hump on their back and a chronic neck flexion that their resting posture is very bizarre looking. They have it all the time. I think that to a large extent, the convenience of that technology is what makes it so popular. The immediate feedback from it is what makes it so addictive. But I think we have to be really careful with our use of it. I’m not a big fan of it.

I wish people would do less of it, particularly with driving. As an emergency physician, I can tell you texting while driving is, in my opinion, probably at least four-folds more dangerous than driving while intoxicated. I’m seeing way more bad, bad accidents as a result of texting while driving than I do from driving while intoxicated.

**DM:** I couldn’t agree more, especially with your observations on the dangers of this chronic flexion of the neck. I’m absolutely convinced that this is a serious, serious issue and one that I actually started to develop myself. Fortunately, there are simple things that you can do to remediate against that. One of the ones I’m recommending – I’ve learned this from Dr. Eric Goodman who’s a chiropractor who developed Foundation Training – is to basically move your head back, slide it up to about 45 degrees, where your chin is almost touching your chest but it’s not in a way that you’re essentially contracting your sternocleidomastoid muscles. You can see them engage.

If you’re in that posture, you’re actually going to change your whole spine and tilt your pelvis anteriorly, and have enormous changes in not only your posture but the nerve that come out of the spine that feeds
your brain. I mean, you’ll feel better. Because this posture that you’re observing in kids, this is so dangerous. If they go on like this for another few decades, they’re going to be crippled and immobilized. You cannot come out of that. That’s got to be permanent.

**MG:** There’s even a social element to it. You remember from medical school the whole issue of the decorticate and decerebrate posturing. Those are very primitive postural reflexes. Flexion posturing is a posturing of submission. You see a dog curl up, roll on its back, and get in a fetal position. Flexion posturing is a submissive position, whereas extensor posturing is a dominant position. In terms of social interaction, someone that is in a chronic flexion posture is in an enormous social disadvantage for any sort of social hierarchy, negotiations, and status on the job. All of those things are related to posture. Someone who has a dominant flexor posturing is going to be fighting an uphill battle as a consequence.

**DM:** Okay. Basically, there are 2 different types of people, if we can just categorize them into these broad groups: people who exercise and people who don’t. I’m wondering what your recommendations are for people who are not permanently engaged in an exercise program to start going into a high-intensity, and then we can discuss the people who are currently exercising. Ninety-eight percent are not doing the high-intensity.

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**MG:** Right. The nice thing for someone who’s been sedentary and is not an exercising person... The way that we handle clients at my facility is we just start. Initially, any attempt of exercising in any meaningful way is going to be dealt as high-intensity by your body. But your body will quickly make adaptations so that the intensity can actually escalate much quicker than you’d realize. I would say simply get started even if it’s just calisthenics in your bedroom. If you start just doing some slow and smooth deep-knee bends, push-ups, and things of that nature, that’s enough just to get the process started. In a nutshell, I would say just get started.

If you want to actually try the type of exercises I recommend, if you go to my website – either the DrMcGuff.com or BodybyScience.net – on my blog, there’s a directory. If you go into the directory, you could actually find a facility that does this kind of exercise and go in for an introductory workout just to get the experience of what it’s like. But the real key is just to try something and get started.

**DM:** Okay. I think probably we should really address the differences because there’s a lot of... From the last time we interviewed you, there’s this perpetual question that continues to come up that relates to the differences between sort of the high-intensity cardio that you can do on a bike, an exercise bike, or an elliptical machine where you’re going (essentially similar principles) all out for 20 to 30 seconds and recovering for 90, and doing multiple sets of that.

If you could differentiate between the 2 in the benefits, because they’re really pretty significantly different in many ways. Your version of high-intensity versus this other version, which I think... The literature is mostly describing this other version that I’m mentioning. Maybe you can discuss the differences between them and some of the pros and cons of each.

**MG:** Okay. I’m a big fan of high-intensity interval training. I think it’s good. What I advocate has a lot in common with it in terms of its metabolic effects. What you’re doing there is you’re triggering an ancient fight or flight mechanism, which results in the release of adrenaline or epinephrine that triggers an amplification cascade, that empties glucose out of the muscles so they can be used for fuel. It brings fat to the muscles so then it can be used as fuel. As a result, it increases your insulin sensitivity and basically starts to reverse or tilt all the effects of the metabolic syndrome. You get that with high-intensity interval training and you get that with high-intensity strength training, which is something that I advocate.
What the difference between HIIT and high-intensity strength training is the degree of muscular fatigue. In evolutionary terms, I would say that high-intensity interval training is like being on the hunt and intermittently sprinting or running for your life for a short span of time, whereas high-intensity strength training would be like getting in a life-and-death wrestling match with someone almost perfectly matched to your capabilities. It would be a massive struggle with great fatigue.

What the strength training does is all of the things that HIIT does, but also induces a rapid and deep level of muscle fatigue. If you start out with a 100 units of strength, by the end of the set, 90 seconds later, you’re going to be left with about 40 units of strength. What that triggers, in addition to all the beneficial metabolic effects, is the synthesis of more contractile tissue and all the metabolic components to support it. It’s like high-intensity interval training but with an extra boost because you’re actually synthesizing more muscle, and therefore, synthesizing more of the metabolic components necessary to support it.

Skeletal muscle is one of the largest glucose reservoirs in our body. It’s going to improve our glycogen storage and utilization capabilities, which improves your insulin sensitivity and does everything to kind of flip the metabolic syndrome on its head. In addition to that, it triggers the release of a lot of these myokines that we’ve been talking about. These myokines have very specific effects on body composition, systemic inflammation, and risk for chronic disease that are outside anything to do with energy balance itself. When we really ramp up the intensity so that the muscle is truly challenged and fatigued, we get a lot of extra benefit out of that.

**DM:** Okay. Let’s dig a little deeper into the differences between the 2 now again, with traditional high-intensity training. I think you referred to it as HIIT.

**MG:** It’s high-intensity interval training. What the difference there is you’re generally using an aerobic piece that doesn’t provide a high degree of resistance against the muscle, but you’re going at it as hard as you can. But it does not induce the degree of muscular fatigue that training with weights in high-intensity and going to muscular fatigue does.

**DM:** Okay. Thank you for expanding on that. Between the 2 now, obviously with this anaerobic HIIT program, you’re really going to get massive cardiovascular benefits and fatigue. I mean, you’re going to typically seek to exceed your maximum target heart rate – 220 minus your age typically – and hold that, which is hard to do. I did super-slow for a while but I don’t remember specifically if in fact the heart rate gets up that high. And all the time I don’t know if it goes to exceed the maximum heart rate. The end result of this is: are you going to get the same cardiovascular benefits with the strength training as you would with HIIT?

**MG:** Yes, and actually a little bit superior. Let me explain why you don’t see the level of heart rate rise with high-intensity strength training that you do with high-intensity interval training. It is actually a reason why it’s a better cardiovascular stimulus. What you’re trying to do when you’re doing hard work, what your cardiovascular system needs to do to supply working muscle is increase cardiac output. That’s the amount of volume that circulated per minute. Cardiac output is the result of 2 things multiplied together. Cardiac output equals your heart rate times your stroke volume. The stroke volume is the amount of blood that’s ejected from the heart with every beat.

What determines how much blood is ejected out of the heart with every beat is how much blood is brought to the heart before each beat by venous return. Now, when you’re doing high-intensity strength training, those intense tonic muscular contractions are milking massive amounts of venous blood back to the heart. That increased venous return causes a larger volume of blood to be in the heart so that each beat you have a much higher stroke volume. In order to increase cardiac output, when you’re doing high-intensity strength training, you’re increasing stroke volume to the extent that you don’t have to increase heart rate as much.
DM: That’s a really great explanation. Thanks.

MG: Now, the other thing that’s important is when you’re doing high-intensity training on an aerobic piece, you’re not getting that much venous return. Your stroke volume is less. You have to compensate. In order to produce an equivalent cardiac output, you have to compensate by producing a higher heart rate to generate that. But once the heart rate goes above a certain point, once it goes above 160 generally, it’s now beating so fast that there is not enough time for cardiac filling to occur between beats. Stroke volume starts to get compromised. It starts to become an inferior cardiovascular stimulus.

Even though when you’re wearing your heart rate monitor, the heart rate is higher. But the heart rate is higher for a bad reason. It’s because the stimulus is starting to break down because you’re not getting enough venous return back to the heart to support an adequate stroke volume. Lots of people will come into my place. They wear their heart rate monitors, and it goes [makes sounds], “Oh.” But when I go out and do sprints, I get my heart rate up to 180. I could only get it to 165 here, and I’m like, “Yes.” That’s a good thing.

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That explains why this is a superior cardiovascular stimulus, because the other thing that we’re really trying to do when we’re improving our cardiovascular health is to improve the coronary artery blood flow. Well, guess what coronary artery blood flow is directly correlated with? Stroke volume. The amount of stroke volume that gets ejected out of the aorta with each beat is the amount of blood that flows back during the relaxation phase, during diastole. That blood flows back into the base of the aorta, where you have little holes, little drain holes at the base of the aorta that go to each of your coronary arteries.

Your coronary arteries get the blood flow when the heart muscle is relaxed. The stroke volume that you have ejected is washing backwards during diastole. If you’re doing a type of exercise that augments stroke volume, you’re actually augmenting coronary artery blood flow, you’re increasing collateralization, you’re increasing the caliber of the coronary arteries, and you’re decreasing the risk of atherosclerotic disease developing there in the first place.

They actually have created a protocol called extracorporeal counterpulsation therapy, where they put these air bladders on your legs to milk venous blood back to your heart to increase stroke volume and patients with heart failure, so that they can augment coronary artery blood flow. Well, it turns out that high-intensity strength training does exactly the same thing. In terms of really going after the cardiovascular benefits that people intuitively know that they need, high-intensity strength training is the bomb.

DM: Okay. Thank you for that really terrific explanation, because it answered a lot of my questions and I’m sure many others on the differences between the 2. My guess is – and I’d like you to discuss this – that it’s your belief after doing this for 40 years plus that this form of high-intensity training is probably superior for the reasons you just mentioned and it is not necessary to do the traditional HIIT if you’re doing the super-slow strength training method.

MG: Yeah, that’s probably true. I think that would be true if you’re otherwise active during the week. If you are chained to a sedentary job, doing just the high-intensity strength training once a week and nothing else but being sedentary, it’s probably not going to cut it. I do like – and I think there is a benefit behind – the high-intensity interval training. It is a specific type of metabolic conditioning that in terms of specificity is just different from strength training. It kind of gives you a little bit wider repertoire. I don’t want to say don’t do it or that it’s inferior; it’s just different. The high-intensity strength training offers a benefit that is different and separate from that.

DM: Right.
MG: I don’t want to say, “That’s bad. Don’t do it,” because that’s incorrect. There’s enormous benefit to be gained from doing that. It’s an extremely time-efficient mechanism of producing aerobic metabolic adaptations.

DM: The people who promote this – and I’m thinking primarily of Phil Campbell, who was my mentor in this – suggest that you do it 2 to 3 times, preferably 3 times a week. But it sounds like (I’m sort of figuring this out real time) would be the super-slow strength training once a week, maybe once a week doing the HIIT.

MG: Yeah. I mean, that would work fine. And really, particularly as the intensity of the exercise goes higher, the amount of volume and frequency of it that your body can tolerate goes down. There cannot ever be a fixed prescription for how frequent you should train as an individual. A lot of that’s going to depend on a lot of lifestyle issues – how much stress you’re under or circadian disruption if you work shift work like I do. All of those things fit into it.

People always got to keep in mind that exercise does not directly cause physiologic improvement. Exercise is simply a stimulus, a negative stressor that’s delivered to your body, which your body then makes an adaptation to and which causes you to improve. But make no mistake, it’s a stimulus that your body has to recover and supercompensate from, and that takes time. You can never let your thinking to generate into more is better; sometimes less is better.

I tell people that as a consequence of their exercise, they should feel better. They should feel above baseline more days than they feel below baseline. Because if you do really hard exercise, you’re going to feel somewhat fatigued afterwards. But that fatigue should not be long lasting and it should not be cumulative. You’re doing this to improve your capability and performance, not to wear yourself down and rag yourself out.

DM: Thank you for stating that. I agree with you so much, and I really appreciate your emphasis on this part because I fully believe that many people – certainly not the majority of people, because majority are not even exercising. But many people who are exercising are just hyper-committed and disciplined individuals, and they are not getting themselves enough recovery. Maybe if you could even spend a few more minutes, because I really appreciate your views on this – and you’ve been one of teachers and mentors in this area – in emphasizing this recovery. You do it so well. Maybe you can give us some more insights as to how to know if in fact you’re not recovering and it may be a mistake to do this workout today.

MG: Well, one of the ways is pay attention to your psychology when you’re working out. If you have a workout schedule and something comes up that causes you to have to miss the workout, if you experience any significant degree of psychic stress over the fact that you’re missing a workout, you’ve got a problem. A lot of people, because of the way that we’re brought up and the American work ethic, they really do think that they can effort their way and aim or attempt their way to health and success.

That’s not how the body works. The body works in balance. There has to be an appropriate balance between a catabolic (a breakdown) and an anabolic (a buildup) state. You have to recover from the exercise bout and then you have to supercompensate from it before you reintroduce the stimulus. Think of exercise as like digging a hole in the ground. You’re going to dig a hole on the ground. Recovery is filling the hole back up. Supercompensation is piling a little more dirt on top.

If you dig a hole on the ground, then you come back, and start digging again before you filled that hole back up, you’re just going to dig a deeper and deeper hole. The effects of your exercise program are going to be negative, not positive. The way to keep track of that is to kind of keep track on some objective means of what your performance is from workout to workout. You should be improving in your
performance on a workout-by-workout basis if you’re fully recovered and supercompensated.

But also just pay attention to how you feel generally between exercise sessions and how you feel during the exercise session itself. If you are appropriately supercompensated, you ought to go in feeling like you’re blowing the doors off this thing. It’s easier than you expected. That’s the way exercise should be from one bout to the next, not this struggle of, “How am I going to do that again,” or “How am I going to better that last performance?” If you’re appropriately managing your recovery, that should not be entering into your mind.

DM: Well, thanks. Those are some great tips. I really appreciate it. If someone is interested in engaging in this form of high-intensity exercise training that you’re advocating and promoting, there obviously are super-slow gyms all across the country that are probably likely not too far from you if you’re living in a large urban area.

Can you maybe describe a program that someone who doesn’t want to go to cost or inconvenience of going to a gym and maybe has a set of dumbbells maybe that goes up to 50 or 100 pounds or so? Is it necessary? When you’re doing the HIIT, you are obviously only exercising one group of muscles. Can you do a similar process? Or is it really necessary to do this range of 6 different exercises to hit all the groups?

MG: No, you can get an incredibly high-intensity workout just in your own home or in a hotel room. There are protocols to take freehand exercises that make them very hard. I would say if you have a simple set of dumbbells or one of those quick chains like Bowflex Max, Powerblock, or anything like that…

DM: The Bowflex are the better ones. I have both, and Bowflex is far superior.

MG: Yup. But anything like that or just a pair of dumbbells at the house, you can do an incredibly effective high-intensity workout using just that.

[----- 50:00 -----]

If you have a rubber ball you can put behind your back, hold the dumbbells in your hand, and do what’s called a static contraction where you just have your hips flexed at 90 degrees and your knees flexed at 90 degrees. You’re in a sitting position without a chair underneath you, holding the weights, and you just hold that position statically for as long as you can. You would not believe how fatiguing that is. Once that’s overtaken you, you can set down the dumbbells and then do very, very slow deep knee bends. By that time, you’ll be so pretty fatigued that your own body weight will be very, very challenging. You’ve done legs there.

And then you can use your dumbbells for an overhead press. Even a small amount of weight, if you don’t have a lot of weight, if you’re doing it with proper form where you initiate the movement as gradually as you can and then move slowly, pressing it up over 10 seconds and lowering it back down over 10 seconds, not resting at any point. You’ll completely fatigue your shoulder girdle in a very short span of time. From there, if you have any sort of chin-up bar or a bar that you can put underneath 2 chairs to do any sort of chinning movement in the same sort of style.

Or if you’re not strong enough to do chin-ups, just walk yourself up to the bar and hold yourself up to the top for as long as you can. After that, you can drop down and do a set of push-ups.


MG: Yes?
DM: What if you can do chin-ups? You’ll just do chin-ups to exhaustion?

MG: If you can do chin-ups, yes. Up and down, slow and smooth until you can’t.

DM: That’s the key: 10 seconds up, 10 seconds down?

MG: Not necessarily. I mean, that may be too hard for some people, but as slow and as smoothly as you can. That, for some people, may be 4 seconds up, 4 seconds down.

DM: Okay.

MG: Or maybe 10, 10 if you’re strong enough. But just slow and smooth and go until fatigue. It doesn’t have to be a particular cadence. A lot of times that 10-second cadence that we use in my place is actually not something that we deliberately aim toward, but something that occurs spontaneously by the behavior that we enforce during the workout and the nature of the equipment. I would just focus on slow and smooth; not yanking, jerking, or creating any momentum; and going until you can’t go anymore.

DM: Okay. That’s another key principle I’ve learned in life: normally if it’s simple, there’s a good chance it’s going to be effective.

MG: Particularly when it comes to the high-intensity strength training, one thing I tell people is: skeletal muscle is genius. It has evolved over millions and millions of years to be very adaptable to all sorts of stimuli. It can ramp itself up and ramp itself down to any specific metabolic demand and it will result in strengthening with almost any meaningful stimulus. Your exercise does not have to be perfect; it just has to be meaningful. If it is, your muscle will do the rest. It’s very smart. It’s very well-adapted. We wouldn’t be here without it.

DM: Yeah. I interrupted you on the pull-ups. If you can continue from there.

MG: All right, if you’re not strong enough to do a pull-up – a lot of women aren’t – just take a chair up to a chin-up bar, pull yourself up to the top so you’re sitting at the very top of it, and hold this position for as long as you can. When you can’t hold anymore, don’t just drop and let go, lower through the lowering portion as slowly as you can manage until you drop back down to the floor. That’s the chin up. And then you can do…

DM: Are there any… Sorry. I just want to…

MG: Yup.

DM: The devil’s in the details. Are there any specific recommendations you have for form, like should their chest be really far forward, grips are far apart, or just do something that’s comfortable?

MG: I would do slight palms up. Let’s see if I can get my hands to show you. Palms up. Slightly narrow the shoulder-width grip and then from there, whatever posture feels strong to you when you’re in that holding position. When you can’t hold anymore, rather than just drop, try to lower slowly as you bend yourself down.

DM: Why an underhand grip instead of an overhand grip?

MG: Because that puts you in the strongest position for engaging all the muscles of your torso musculature. When your hand is supinated and at shoulder width, you’re actually using your bicep in its strongest position. If you have your hands out or pronated, you’re actually using smaller muscles. You’re using your brachialis and brachioradialis that are going to be a weak link in that movement and cause you to fatigue prematurely before you’ve challenged the bigger muscles in your torso.
DM: Okay, good. All right. After the pull-up, what’s next?

MG: Just drop down on the ground and do a good ole military-style push-up. If you’re strong enough, you can just do it strict marine-type push-ups, where your body is in a plank position. Start with arms straight. Go slowly down until your chest almost touches the floor. Slowly turn around and push back up. If you’re strong enough, use a very slow cadence of 10 seconds down, 10 seconds up. If you’re not strong enough, you can do push-ups from your knee, or you can do them up against the countertop, where your entire plank torso is now on an incline to decrease the resistance.

DM: Okay. Anything after that?

MG: I think that would be enough to get anyone started. Once someone gets started, as long as they’re doing it hard enough, they’re going to see rapid improvement. They’re going to be hooked. And then it’s going to be hard to challenge yourself with what you have at hand and then you’re going to go to the next level. But probably if you just do those things, you’ll be hooked and the rest will be history.

DM: Do you think it would be a wise investment for someone, who’s committed doing this and whatever the reason is they don’t have the resources to do it otherwise, to invest in a personal one-on-one session with a good personal trainer to make sure that their form is good? Because a lot of times when you do these exercises, if your form is bad, you’re actually practicing something that’s bad for your body. I’m wondering what your thoughts are on that.

MG: Yeah. I think that’s very beneficial. I would tell people, even if you got to make a 2- or 3-hour trip, look on the directory on my blog – DrMcGuff.com. Just go to the blog there. Once you get on the blog, there’s a directory. I know all the people that are in my directory. No one’s going to hit you with hard sales pressure or anything like that. If you just want to go and have a single session, you can do that. You’ll learn some elements about form. You’ll learn a lot about exercise. But most importantly, you will have a benchmark for the experience that you’re seeking out when you exercise.

Once you have that benchmark, you become more expert at generating appropriate exercise for yourself than just about any random trainer you could find at a regular gym. If you can just have a first-hand experience of getting what I’m talking about here, that can go a long way towards training yourself at home. One or 2 sessions like that is worth its weight in gold for you knowing how to reproduce that for yourself at home.

DM: And because you’ll have actual physical experience of how it feels.

MG: Yes.

DM: It’s hard to reproduce it if you haven’t gone through that before.

MG: Correct. The first time experience of it is just unlike anything you’ve ever imagined. If anyone’s ever wrestled in high school, that’s the closest experience I can describe. When someone’s doing it correctly, it’s like you are in hand-to-hand combat with someone that is perfectly matched to you with regards to strength. You’re just like the little chameleon lizard finding itself in the mirror. You’ll go until exhaustion, and you’re done.

But the muscular and the metabolic sensation of that is a distinctly unique feeling that once you have it, you have some sort of benchmark and you’re able to reproduce it. You can tweak your own exercise at home to produce an approximation of that. I find that if you can get 85 percent of the way there, in general, that’s good enough. That will get you so much more than almost any other form of exercise.
DM: Yeah. And the key point here is, just to emphasize what you’ve said previously, that these sessions are not done more than once a week. I mean, if you’re going through one of these trainings. It could be less frequent than that based on the principles you just shared on how to know if your body’s out of recovery.

MG: That’s correct. The frequency of the exercise is always going to be somewhat dependent upon the individual and about how much intensity they know how to bring to their own workout. Initially, a lot of clients can come and they can train 2 times a week because in the early phases, you’re literally not strong enough to generate enough intensity to really task your recovery system that much. For a period of time, 2 times a week works great.

But then, we start to have to back off every 5th day, every 7th day. And even really advanced subjects, some of them can go as frequently as every 10 to 14 days and produce optimal results. Actually, as you get stronger, the intensity that you can deliver reflect back on to yourself becomes higher, which necessitates a longer recovery interval and which seems counterintuitive to what most people have done in the past. They always thought, “As I get stronger and better, I need to exercise more.” What we’ve actually found is you can actually bring more intensity to yourself, which necessitates a longer recovery interval.

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DM: Are there any other resources for those who are interested in engaging in this type of exercise program at their home other than the brief description you just provided in this video?

MG: Well, yeah, if you go to my website – DrMcGuff.com– there are links there to a whole YouTube library of lots of people doing workouts. You can actually see workouts done at different places, various facilities. On my blog, just on this week’s blog post, one of my posters, a fellow named Bryce, he does all of his workouts exclusively at home with a rubber ball and a set of kettlebells. There is another fellow named Richard Chartrand on there. You can click on these people. They post their workouts on my blog. You can watch how people are doing it at home. You can see on the YouTube channel demonstration workouts done at various facilities around the country.

You’ll get an idea of what it looks like. And really, when you watch it, you’ll be surprised. It doesn’t look like much because we do our exercise very intense, but we do it with very controlled motion. We try to do it without much drama and a lot stoicism, so you’re kind of like, “It don’t look like much,” until you get to the end of the set and you’re watching. You’re kind of like, “Wow, that really is intense.” That’s a good resource to go to. You’ll get some sort of idea of what we’re talking about here.

DM: Perfect. Thanks. That’s exactly what I was looking for. For those who are watching this, who decide that it makes a lot of sense to engage in this type of exercise program at their home other than the brief description you just provided in this video?

MG: Well, I try not to. I try not to advocate anything that’s regimented. That evolved over the years. Because in the early stages of this high-intensity training paradigm, there was a huge emphasis on the importance of recovery. We actually tried to restrain people from being too active in between workouts, so we could save all of that recovery for the exercise session itself.

What we found over time was that did not workout at all, because all of our clients, all of a sudden, started becoming very, very active, spontaneously active. What I try to tell my clients and what I’ll try to tell all your listeners here is: if you enact this sort of exercise regimen, just pay attention to your body because what you’ll find is you will have an insatiable urge to be active. You will want to go out and start
gardening. You will take up sports that you gave up decades ago. All of this will happen spontaneously. When it does, let it.

If someone has a very sedentary job, I would say try to work your way around that because as you become more muscually fit, you’re going to find that unbearable. You’re going to be unable to sit still. You will not wait for an elevator; you will take the stairs. I would look into getting a treadmill desk or a standing desk, or enforcing getting up and moving around the office as frequently as you feel like you need to. But once you activate the skeletal muscle, all I tell people to do is listen to your body because it’s going to tell you to be active.

DM: Okay. Well, that’s good. It’s probably another criteria you can add to the list of tips that you gave earlier to know if you have enough recovery, because this spontaneous tendency towards movement is not going to exist if you’re still needing recovery.

MG: That’s correct.

DM: Yeah. But what about the stretching component? Because this loss of general flexibility seems to progressively occur with most people who are engaged in some type of regular intermittent movement. It would seem like it might be wise to do some stretching, which doesn’t really tax your muscles too much, but is just designed to improve your flexibility and range of motions.

MG: Yeah. A few things about stretching: doing this sort of strength training will go a long way towards improving that. What we’re trying to improve is not so much flexibility but mobility, okay? Because increased flexibility is not always a positive thing. A lot of our joints, the shoulder joint, for instance, has a very small articular surface and a very big articular head, so it’s hyper-mobile. Sometimes it moves too much and is very prone to injuries. Enhancing or increasing flexibility around the shoulder joint may actually make it more vulnerable.

With strength training, you’re getting an application of force through a full range of motion. That enhances your mobility in a functional way. That’s one thing that you’re going to do that’s going to be right off the bat. But the other is just to avoid being in any position for a prolonged period of time because that is what undermines mobility. You don’t necessarily need a lot of flexibility in your joints by doing specific stretching exercises, but what you do need is mobility.

You can just Google “mobility exercises” on the Internet. You’ll see all sorts of little drills that aren’t actually stretching but are actually causing your body to move around in a natural way that preserves its natural mobility. A lot of times, doing that kind of activity and being generally active is better than spending time doing a hurdle, stretch, or certain specific stretching movements. Does that make sense?

DM: Sure does. What do you think of balance activities? I could think of one specific item that many people seem to enjoy – the slackline, which is that 2-inch line you usually hang up between 2 trees and walk in on that to also engage in that element, because strength training and high-intensity training typically don’t engage the proprioceptive component.

MG: Well, it actually does in a way that you wouldn’t normally recognize until you do it. But the proprioceptive component is very much at play during a properly done high-intensity strength-training, where you’re controlling the cadence, moving slowly, and trying to engage the weight in a way that rather than just trying to get the way up, you’re trying to engage the weight in a way that fatigues the muscle maximally. That really does engage the proprioceptive component.

Now, in terms of these balance exercises, I certainly think they’re beneficial. But balance comes from 2 things: (1) strength and the other is (2) specific capability. Strength will be addressed by your exercise program. Your muscle gets stronger. You’re going to be more prone to balance. Old people fall not
because the balance organ in their inner ear has gone bad. They fall because they’re weak. The moment they lose that bone-on-bone contact, the joint dens may have to use muscle to keep themselves upright. They’re so weakened that they just topple and fall. Old people’s falling is not a balance problem; it’s a strength problem.

**DM:** Excuse me, to interrupt you for a moment. That is an important point because falling when you’re old could mean death.

**MG:** Yes, absolutely.

**DM:** You see it all the time in the ER.

**MG:** Yup, absolutely. You break a hip. You have to have surgery. You get a deep vein thrombosis (DVT), a clot in your leg. It breaks off and goes to your lungs, pulmonary embolism, and you’re dead. I mean, it’s a slippery slope once that starts to happen. That’s why it’s so important for strength as we age.

The interesting thing, one of the studies on interleukins that I have here, they found an interesting overexpression of interleukin-6 in a population of centenarians, of people that lived beyond a 100. Their level of interleukin-6, the muscle-expressed myokine, is much, much higher than other elderly people that are younger than them. There is a strong correlation between one of these interleukins that are synthesized by skeletal muscle and longevity. I think it is precisely because these people remain strong enough not to fall and break their hip at age 72 and then go down the slippery slope.

But back to your question about balance, you have to realize that strength is the major component that makes that possible. Anything that you want to improve balance upon is a very skill-specific thing. For instance, doing slackline will make your balance very good for doing slackline. But for other things that are balance related like riding a skateboard or keeping your balance on a bicycle, it won’t necessarily translate. The balance skills are very specific. You can get very good at specific balance exercises, but the translation of those balance skills to other activities may or may not translate very well.

A champion skateboarder may be a lousy surfer or wakeboarder. I remember seeing MTV Sports. They took out a group of champion skateboarders and BMX trick riders out to go wakeboarding. Thinking that they got all these balance skills, they’re going to be really great at it. But they were like any amateur at it. They were just getting plowed by the lake water the whole afternoon. These balance skills are very specific. They’re good to train, but realize that they may only be good for that specific thing.

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**DM:** Okay. My last question for you is your experience with Power Plate and if you’ve ever integrated the super-slow training into using the Power Plate.

**MG:** I haven’t because the type of equipment that we use there is not really a practical way to incorporate that. I’ve seen a lot of studies that seem to be very positive about the effects of using that modality. One thing I find is that this vibrational contraction that you observe, we have… It becomes evident in the high-intensity strength training. It’s called pulse-modulation. What happens is as the muscle fatigues, motor units, groups of muscle fibers within the muscle, fatigue out and they drop out. These muscle fibers are firing like the pistons of a car.

When you have a lot of them firing simultaneously in this alternating pattern, it produces very smooth movement. But about halfway through a working set of high-intensity strength training, the motor units start to fall out. It’s like pulling spark plugs on an engine. The engine starts to run rough. Well, what we have is that as you start to fatigue, you will actually see your movement start producing this vibratory pattern to it. Because motor units are dropping out, you’re losing pistons and it starts to run rough. The
vibration is actually built in as a component of the fatigue. I wonder if the beneficial effect of this vibration plate is actually a reproduction of something that occurs spontaneously as you approach fatigue during meaningful exertion.

DM: Yeah.

MG: But thank you for your question. No, I’ve not deliberately incorporated it. But it’s because of the type of equipment we use. It’s kind of hard to do that.

DM: But for people who are using dumbbells, they could integrate it because they can just stand on the platform and do that.

MG: Yeah. Without any first-hand experience though, I couldn’t specifically recommend it because I have not actually tried it. I would only caution against it if, for any reason, the vibration seem to produce instability where you feel like you’re off balanced. But I really do think that as you try this high-intensity exercise that you note as you get towards the end of the set with fatigue, that vibration seems to happen spontaneously and is built-in. But I don’t know of any studies or any data that say the 2 are synergistic. But it seems to be a logical assumption that it could be.

DM: Okay. Well, thank you for all your time and for all you’ve done. I would like to give you the opportunity to have any closing statement and then I can add my other comments.

MG: I think the closing statement is: just get started. Go do something of a meaningful intensity because what we’re finding is that the sum is much, much greater than its individual parts and that you’re producing hormonally active substances that do everything that we want to reverse the diseases of modern civilization. It’s all in skeletal muscle.

If you engage it in a meaningful fashion, you’re going to do everything that you possibly can to augment your metabolic health, your cardiovascular health, your general health, bone mineral density, and protect against Alzheimer’s or cancer. I mean, it is all there. All of these beneficial myokines released. We’re just learning about it. It’s very exciting, and it’s good, good stuff. Go get yourself some.

DM: Thank you for all your pioneering work, for being a veteran out there for over 4 decades, for engaging in this, for pushing the frontier, and for helping us understand how to do this. I want to thank you personally because you really inspire me and actually motivated me to change my own exercise program. I’m going to be integrating the super-slow. I think there’s actually a super-slow facility not too far from my office in Chicago. I did it for like a year or so. But I stopped. But I think I’m going to try it with the weights at home. I think it seems pretty simple and easy to do. I’m just really intrigued with the benefits. I mean, you brought in an incredibly compelling metabolic justification for doing this. I just really appreciate and thank you so much for it.

MG: Yeah. I’m just happy that it has worked for you.

[END]