A Special Interview with Dr. Doug McGuff

By Dr. Mercola

DM: Dr. Joseph Mercola
MG: Doug McGuff

Introduction:

DM: Welcome, everyone! This is Dr. Mercola. Today we are here with Dr. Doug McGuff, who is an expert in one of my new passions of exercise, which is high-intensity exercise. Dr. McGuff has been doing this for a while, and he's an emergency room physician. He is also passionate about exercise that can really have such a dramatic ability to influence your health.

Interestingly, many may not realize this, but one of the reasons that I went into medicine was really to apply my interest in exercise to optimize health. Of course, it morphed into other things like nutrition and such, but it really has been a longstanding passion I've started. I've been exercising since '68. Only recently – in the last two years – I started to fully appreciate the benefits of high-intensity exercise. After doing 42 years of essentially long-distance running, I switched over to this. I don't regret it. I stopped the cardio completely, and I'm experiencing the benefits of that.

We're just delighted to have Dr. McGuff here today to help us understand this highly beneficial form of exercise so we can apply it and start reaping the benefits ourselves. Welcome, Dr. McGuff. Could you tell our viewers exactly what your training is, and how you came to apply your interest in exercise into the current format you're working with?

MG: Okay. It's a pleasure to be here. I'm a medical physician. I'm an M.D. and my specialty training is in emergency medicine. Like you, I was actually drawn into medical school by an interest in exercise that began when I was a teenager. I ended up in emergency medicine, because I found that's where my natural talents lie, and also because I could not find any specialty of medicine that I felt was giving an appropriate representation of what exercise should be. I have already developed some opinions on the topic before I ever made it to medical school. I just did not find a specialty that would fit. I thought that perhaps orthopedics or physical medicine and rehabilitation would do it, but I felt they were way off base.

I originally became interested in exercises when I was about 14 years old. I was in a sport called bicycle motocross or BMX, which is a type of sprint race done offroad on bicycles. At the time, I was just starting in it and found myself quite weak in the sport. In particular, there were certain sections that involved a large hill climb that I could not make. My brother had just one of these seaman plastic barbell sets in the garage. I decided to break out the manual for that and give that a try.
Within one month, I was literally astounded. I essentially went from last-place to untouchable. I tried for the better part of the year to keep my training activity a secret. That sort of launched me to a level on the sport, where I was doing really well. Ironically, I made it to the professional level by the time I was 17. It was my passion for high-intensity training as advocated by Arthur Jones that probably kept me from going as high in that sport as I should.

At that level, they start to feel that if I’m resting, someone else is training. I actually overtrained. I was doing three very hard sessions per week religiously, in addition to the racing schedule. I just winded out. I think, in retrospect, if I want to have the insight to pay attention to the recovery side of the equation, I would have done much, much better. That’s kind of how I evolved this interest in high-intensity exercise and kind of took it on from there.

**DM:** Thank you for that explanation. Hopefully, you’ll share with us the tips on how to pay attention there, because it’s clearly not an issue for many people, but anyone as competitive is going to push it to the limit to know what parameters to monitor to make sure you’ll get enough recovery. It’s going to be crucial. How did you refine your interest and learned more about the specifics of high-intensity training?

**MG:** Well, I always continue to do high-intensity strength training. I follow the works of Arthur Jones, Mike Mentzer, and the people in the high-intensity strength training movement throughout my whole life, all the way through college, and even through medical school.

What happened is the knowledge that I brought from that background as I entered medical school started to merge with what I was learning in medical school. Although the two were completely truly unrelated, I started to integrate knowledge from one into the other and saw where each was “missing the boat,” so to speak. I didn’t really refine that until after I was out of medical school and residency.

I started to really pay more attention to restricting the amount of training that was being done and augmenting the amount of recovery time. I started to realize that there was actually a spectrum of recovery capabilities amongst different people in a population, and I wasn’t in a place on the spectrum where I thought I was. But when I actually started to space my workouts further and further apart, as I did so, I was getting better and better results. I realized that for so much of the time preceding, I was feeling terrible. I didn’t really realize I was feeling terrible, until I was fully recovered and was like, “Wow! So this is what it could have felt like.” That’s kind of how this started to evolve for me.

**DM:** That’s terrific. Interestingly, I was visiting the former medical director of Nautilus, Dr. Michael Fulton, who had worked with Arthur Jones.

**MG:** Yes.

**DM:** I went in for an evaluation to see if I could optimize some of my specific training. I’m just wondering since we have the same language. I would like to get your definition of high-intensity training. My perception – what I have been recommending – is more of
an anaerobic cardio training that can be done with weights, but is primarily done with cardio, which is based on Phil Campbell’s work where you’re doing any type of cardio activity like elliptical training or recumbent bike where you warm up for three minutes, go all out for 30 seconds, recover for 90, do eight cycles of that, and then cool down. We call that Peak 8. I’m wondering if you could essentially let us know what you’d classify as high-intensity training.

MG: That certainly qualifies. That is one modality to bring about high-intensity training, and the term that I have used for that is “high-intensity interval training.”

DM: Okay.

MG: The type of training that I am advocating is similar to that, but it’s being done with weight equipment.

DM: Okay.

MG: Now to ask this question, it kind of opens up a whole can of worms, because you spoke about anaerobic type training, you spoke about aerobic type training, and you spoke about cardiovascular training. That becomes a little bit difficult, because those are all kind of false constructs created by the fitness industry. The first thing you have to realize is to do cardiovascular exercise. The only way that you can access the cardiovascular system is by performing mechanical work with muscle.

Now, you can do that on an elliptical. You can do it on a Schwinn Airdyne. You can do it on quality weight training equipment or with a barbell. As long as you’re doing mechanical work with muscle, you’re accessing the cardiovascular system. It’s what supplies and supports that kind of work.

If you look at cellular metabolism, that sort of work, whether you’re doing aerobic low-intensity work or high-intensity work, proceeds to a certain shuttle. You take glucose into the cell and you go through glycolysis, which is about a 20-step chemical process.

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That glucose and that 20 steps are turned into pyruvate. That pyruvate is then moved into the mitochondria, where it goes to a cycle of chemical reactions in the presence of oxygen. What occurs from glucose to pyruvate is in the absence of oxygen, that’s the anaerobic metabolism you referred to. Then the pyruvate gets moved into the mitochondria and that becomes your aerobic metabolism.

But the thing you have to realize is that you cannot carry out any aerobic work without doing any anaerobic work first. The aerobic cycle cannot even run unless it has the substrate delivered from the anaerobic cycle. The anaerobic cycle can deliver that substrate faster than the mitochondria can use it. So if you want an aerobic workout, the best way to do it is by delivering that substrate as fast as possible, and that requires high-intensity exercise.
That is why high-intensity interval training that takes five to seven minutes has been proven to be equally as beneficial for producing aerobic metabolic adaptations, as long-term studies state aerobic activity that took an hour that would produce 40.

The thing to keep in mind is that the exercise physiology world has created an inextricable link between the aerobic metabolic system and cardiovascular. That's not even true at all. There's no way that the heart and blood vessels are hooked up only to the mitochondria. The heart and blood vessels support the entire cellular metabolism. The best way to get that benefit is with high-intensity intermittent exercise. Whether that's done on the elliptical or moving from one weight training station to another briskly does not matter.

DM: Thank you for the explanation. Just to have a follow up question on that, the person who inspired me to participate in exercise is Dr. Ken Cooper, and I'm sure you know who he is.

MG: Yes.

DM: He wrote his book *Aerobics* in 1968. When it was first published, it's when I started exercising. That sort of established that term within the fitness industry. I have a great admiration for Dr. Cooper, because in my view he is really the catalyst that inspired exercise revolution in the United States. I'm sure you're familiar that in the 60s and earlier, the rehab for heart attack was like six weeks of bedrest.

MG: Yeah.

DM: [Laughs] That was the standard of care. But of course, he helped changed that. He didn't advocate anaerobic training. I'm just wondering if you could expound on what you just stated and help us understand how you do get the same benefits – the other benefits you'll get if you just participate in a program that he had originally recommended, which was this long-slow distance or marathon training. It's an extreme.

MG: Yeah. There are a few things. One is that the whole aerobics movement that Dr. Cooper created was a great example of a viral mean taking hold and the unintended consequences of it. By the late 80s, early 90s, being a true scientist he realized that what he advocated was not working. He has since refined his recommendation: don't do long-slow distance, you need to reel that way back. Now he's a much bigger advocate of resistance training.

There are several reasons for that. One is that you have to know that cardiovascular disease is much more than what aerobics addresses. It has a lot to do with your metabolic condition, and your metabolic condition has a lot to do with how you handle glucose within the muscle cell. If you have a large storage reservoir for that glucose, then you're not going to get at a point where you have too much glucose within the cell and have a need to downregulate your insulin sensitivity that protects the cell from excess glucose.

What we need to understand is that with high-intensity exercise, you are sequentially recruiting all the different types of muscle fibers that you have. First, you recruit the
smaller motor units that are made up of slow-twitch fibers that are largely aerobic in metabolism, have a lot of endurance, and recover quickly.

If you fatigue through those, you will next recruit some intermediate fibers. If you do that quickly enough, then you will recruit these fast-twitch fibers, which are largely glycolytic but are also the largest storage reservoir for all these glucose. If you do that, you will actually create a stimulus that causes more muscle growth and enlarges that glucose storage reservoir, which enhances your insulin sensitivity that has a large upstream effect toward preventing cardiovascular disease.

Now flip that on its head. If you’re doing long-slow distance type of exercise, what you’re doing is you’re very gradually recruiting the slow-twitch motor units. If you remember those will recover quickly. So rather than moving to the next set of motor units, you’re just recruiting that one group over and over again.

What the biologic adaption for the intermediate and fast-twitch fiber becomes: this animal is carrying out any sort of activity where this extra muscle tissue is just dead weight that’s being carried along. The physiologic adaptation for that is to atrophy of those muscle cells, which takes away the largest component of that glucose reservoir that you have. So now you have a condition where you’re trying to exclusively train the aerobic component of metabolism, which isn’t really even possible. But you have also reached the condition where you’ve lost a significant amount of muscle tissue, specifically the type of muscle tissue that stores glycogen. You’re going to have an earlier onset of loss of insulin sensitivity and then the whole cascade of the metabolic syndrome that occurs as a consequence.

**DM:** Interesting. What is your take on the diet influence on this whole biochemical process that you just described? It would seem that if you’re optimizing your diet by not having a lot of sugars and processed foods and by making sure you have high-quality healthy fat, that you would also optimize these biochemical pathways and facilitate and synergize the effects of the exercise.

**MG:** Oh absolutely. You have to look at that concept in the light of evolution. The way to do that… I don’t know if you’ve ever done a survival course, but I was in the military and we had to do 72 hours on the field surviving off the land. When you do that, you start to realize that if you let someone go out on hunt-and-gather and bring back all the foodstuff that they could hunt and gather, what you’ll find is that the carbohydrate would produce the least caloric density in a hunter-gatherer environment. That is the thing that you can find the least of. You can get the most caloric density out of meat in animals. You get a lot more out of fauna than you do out of flora. So it only makes sense that the signal to store energy is going to be predicated on an abundance of that which is least abundant in the wild environment.

The problem is in modern times that element that should have been least abundant in our natural environment from which our genome evolved is now the most abundant and is so easily obtainable that it can overwhelm the system. Our skeletal muscle – if we’re lucky – can hold maybe 250 grams of glucose, and our liver holds about 70. If you take 320 grams of glucose as what your storage capacity is, you can kill that with a single trip
to Starbucks. Once you’re beyond that your body is going to find some sort of way to deal with that excess carbohydrate.

If your glycogen storage is full, your body has nowhere else to put it. So instead of going all the way through this metabolic pathway, it takes a few steps into the metabolic pathway from glucose inside the cell, and then gets shuttled to a high-energy shuttle that produce body fat, that’s called the novel glycogenosis. We are in the midst of a very bizarre, evil-scientist type experiment with what’s going on in the Western world, because we are dumping into our bodies an amount of carbohydrate and, in particular, refined sugars that are way above the capacity of our metabolism to handle normally.

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DM: Thank you for clarifying that. I also wanted to point out one item, when you’re previously referencing your comments on the long-slow distance training. Just to more broadly apply that to anyone listening – I’m sure you would agree that it would also include the runner who’s going out training for a marathon, the 90 percent of people that we see exercising in fitness centers that are on the cardio equipment, the biker, the elliptical, or the treadmill and just going long and slow or even many in the aerobics classes.

MG: Yeah, even just a half hour, and the issue isn’t necessarily running for hours and hours and hours. It’s the modality itself. You will never in nature, see an animal jogging.

DM: [Laughs]

MG: I invite all your listeners, if they have young children: go a little early at recess time and watch them. You will see a very bursty, high-intensity activity pattern. They will run for five to 20 seconds, and then they’ll stop and rest for 30 seconds or two minutes. Then repeat over and over again. If you pay attention to your children – if they’re allowed to play like that – they cannot be made short of breath. They can run long distances without feeling winded. They can sprint all the way down the street, come back, and talk to you in a normal voice.

What the study state activity does is it trains the plasticity out of your physiologic system. That ability to handle widely varying levels of exertion within a short span of time gets trained away. You actually make yourself less plastic and less adaptable to physical stress in general.

DM: Thank you for making that more clear. I’ll set a question on the fast muscle fibers you referenced. That was actually one of the aspects of high-intensity training that initially attracted me to it, with the appreciation that the fast fibers are the ones that actually produce the growth hormone. The bulk of our population is actually going through somatopause, which is similar to menopause.

MG: Right.
DM: That in a 40 or 30 year old, we have this dramatic decline of human growth hormones. I’m wondering if you could talk about the benefits of human growth hormones, somatopause, and how high intensity addresses that.

MG: If you dive deeper into the literature, what you’ll find is you’ll start to see a strong correlation between somatopause and age-related sarcopenia that kids tend to develop at the same time, and it’s because the two are intrinsically linked. It’s sort of a positive feedback loop. The growth hormone is needed to sustain and grow those higher-order motor units that are fast-twitch and produce a lot of power.

DM: Let me just insert here for those non-medical listeners. Sarcopenia is a loss of muscle.

MG: Right. That’s age-related muscle loss. I’m sorry. It’s sort of a positive or – if you’re starting to lose muscle – a negative feedback loop. Those higher-order motor units that are fast-twitch and produce a lot of power require growth hormone to sustain them, but also stimulate it. What seems to be evident is that a high-intensity exercise stimulus is what triggers the body to make an adaptive response to hold on to muscle. We have to remember that muscle is a very metabolically expensive tissue. It’s by far the most expensive tissues other than your brain that your body has to maintain. If you become sedentary and send your body a signal that this tissue is not being used, then that tissue is metabolically expensive. The adaptation is to deconstruct that tissue, because it does have a metabolic expense.

I think the evolutionary adaptation is the assumption that somehow this animal’s injured and is trying to recover. We need to conserve as much caloric energy as possible for the healing process. So we’re going to down regulate this fast-twitch muscle, so as not to impose a metabolic demand on this healing animal.

The problem is in the modern society we’re not healing. We’re just sitting on our desks. That adaptation to deconstruct that expensive tissue is still programmed into our genome, but is being applied in a way that is very novel and very negative.

DM: Yes. Similarly, we have the metabolic side of that. We have this ability to store fat readily, because our ancient ancestors didn’t have access to calories 24/7 unlike we do. We have the metabolic machinery to do that unfortunately. [Laughs]

MG: Right.

DM: It just sabotages us and just pushes us in the wrong direction. I guess this is the other side of…

MG: Absolutely, and in a hunter-gatherer environment, there probably never was the opportunity for a human to become morbidly obese. There probably never evolved an effective feedback loop to say, “Okay, I’m effed already. Stop eating.” That negative feedback loop never had the opportunity to evolve.
To some extent, the feedback of hormones from the fat cells like leptin and from the stomach like ghrelin do have some negative feedback. But once you are into the full effects – the metabolic syndrome, and you have high levels of serum insulin – your sensitivity to those hormones goes away. It is a novel metabolic situation that we’re in that absolutely takes away any negative feedback from just becoming fatter and fatter and fatter.

Interestingly, I’ve noticed in the past few years that when I do CT scans on morbidly obese people, I used to think that, “Wow! These people are essentially lifting weights all the time. There are probably big muscles underneath all that fat.” Well, the exact opposite is true. I have seen morbidly obese people with severe flank pain that is thought to potentially be kidney stones or a kidney infection, when what is actually happening is their external oblique muscle has atrophied to the point where it’s paper-thin, and it’s stretching to the point of tearing.

The reason is once you’ve become that metabolically deranged, you’re having internal starvation. You can take in energy, but your insulin sensitivity is so poor and your serum insulin levels are so high that anything that you intake the only metabolic destination it can go to is fat storage.

DM: Interesting.

MG: So you eat and it immediately goes to fat storage. Nothing has gone to supply the working muscle cells or the working metabolism with energy. Then within an hour and a half you’re ravenous again, so you eat again, but it all gets shunned into fat storage. That is a horrible Catch 22 that the morbidly obese suffer. They’re chronically ravenous even though they weigh 450 lbs.

DM: So that 400, 500 or 700 lbs. person, though, once they change their eating pattern and shifted to more of a fat-metabolic burning system, then it’s likely that the extra weight would actually be beneficial. It would be a useful workout.

MG: Yeah. They’ll actually tap that as an energy source, once they’ve become metabolically trained to do so. The way to do that in a morbidly obese person is to significantly restrict carbohydrate – probably less than 50 grams a day – and have them partake in a high-intensity exercise, because what that does is it taps those higher-order motor units.

Through an amplification cascade, when you’re doing a high-intensity exercise, you very aggressively empty sugar out of the muscle cells. By doing that and combining over the low-carbohydrate diet, you start to heal the metabolism. They are able to access their energy source finally. That’s how they can turn things around.

DM: Thank you for highlighting the importance of the diet. I really think that they are in a roll and synergistic.

MG: Yeah. Not only in a roll and synergistic, but I come to realize this. I’m a big, big exercise guy. But I will be the first one to tell you that you cannot exercise your way out of a bad diet. You have to exercise with a good diet. You can have a good diet without
exercise and still get fairly good results, but you cannot get good results with exercise and a bad diet.

**DM:** I couldn’t agree more. I just like to get your perspective on this, as a real professional expert on this area. I interviewed Mark Sisson, who’s a world-class athlete. He has a passion in this area also. His estimate was that diet was about 80 percent responsible for the status of your health, and exercise is 20. Even though, obviously, he is a passionate exercise person, too. What’s your take? Do you agree with Mark or do you have a different set of numbers?

**MG:** I think that’s probably a good mental construct to orient people on how to focus their behavior, but it may be even a much higher number towards diet and here’s why.

**DM:** [Laughs] Oh my gosh, really?

**MG:** Yeah. Here’s why. A lot of times, I caution people not to partake in very intensive exercise until they have their diet in order.

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The standard American diet is highly inflammatory. It produces systemic inflammation of an order that is almost beyond belief. In that state, if you do exercise of any significant stress, you’re just adding inflammation on top of the inflammation, and you’re actually putting yourself at a bit of a risk. I advise people to get their diet straight, and then exercise. Because I think a highly inflammatory diet, in combination with the acute systemic inflammation that occurs as a part of the exercise stimulus, can actually be a negative thing.

**DM:** That’s a really profound insight, and I thank you for sharing that. When you hear the truth, it just lights up. I wouldn’t dispute any of that, but it’s just so profound. I’m absolutely going to be integrating that into the recommendations on the site, because it makes so much sense.

**MG:** I think what Mike said would be a very useful mental construct for getting people to focus their efforts appropriately. But it’s just that it’s a mental construct. I don’t think it’s a literal thing. The two things are synergistic, but the component that is so synergistic is the diet. It can be synergistically good or it can be synergistically bad.

**DM:** Let’s talk about the diet a little more.

**MG:** Okay.

**DM:** Give me a little history of my understanding of your work. I first heard of you I think maybe 10 years ago or so, and I was doing super slow training. Then I kind of forgot about you, because you weren’t in my scope of reading. But then I watched a number of videos from the recent Ancestral Health Symposium, and you were one of the speakers there.

**MG:** Right.
DM: I was really impressed with your information that’s why we contacted you for the interview. Obviously, you’re interested in upholding your hunter-gatherer approach. I’m wondering if you could discuss your transition to that: how you came to the appreciation of the importance of diet, and perhaps your other insights on the crucial nature of nutrition in your health with respect to fitness.

MG: Yeah. I’m sure aware that in medical school, the training in nutrition is abysmal, if not completely absent. Also, my background with Arthur Jones, Ellington Darden, and Mike Mentzer – their whole focus was on high-intensity exercise, and very little was on diet. They actually – to some extent – pooh-poohed the importance of diet, ssesssentially saying that it’s calories-in, calories-out. If appropriate calories are available, your body will take care of the rest.

I actually even wrote an article in 1997, saying someone could get lean and in good condition on a diet of Skittles that has 2,000 calories a day. It’s probably the dumbest thing that I have ever written.

I first started to become aware of the importance of diet, in particular with regards to omega-3 fatty acids, when a cardiothoracic surgeon that was involved in super-slow – a fellow on San Antonio, Texas named Dr. Charles Christian – made me aware of the research on the effects of the fatty acid profile: omega-3 versus omega-6. I started to investigate that mostly as a personal favor to him. I still thought he was being kind of quack, but as I opened the literature, I was astounded at how little I knew.

I became more oriented towards a Paleolithic diet based on the website of Arthur De Vany, who’s one of the grandfathers of advocating a hunter-gatherer type of diet. It just made perfect sense to me that how they should eat, how they should move, and how we should literally live is predicated on the environment in which our genome was formed.

If you took a time scale and looked at the amount of time it took our genome to develop in a hunter-gatherer sense versus the amount of time that we’ve had in industrialized food source, it’s a flash in the pan. It only makes sense that our current diet and environment was incongruent with what our genome was requiring for health. I just kind of dealt further and further into that.

In my own personal training business, I started to advocate and incorporate it with the clients. Along the way, I have made a million and one refinements and tweaks to the exercise protocol and in the equipment that we use. We couldn’t try to make the exercise side of the equation anymore perfect. To be quite honest, all those little tweaks produced very little in the way of results.

In the past several years, as I have put mostly the works of Mark Sisson in the hands of my clients to use in conjunction with my exercise program, we saw dramatic physical transformations. That really drove home the importance to me of diet as we have discussed previously. I mean, just seeing it first-hand. Because for almost a decade, we really refined and tweaked the exercise side of the equation without much the show for
it, but just basically giving someone Mark Sisson’s material, say, “Hey! Look this over,” and saw incredible physical transformation.

**DM:** Thank you for your desire to be a perpetual student. Because in my observation, there’s a significant amount of professional arrogance in many physicians – I guess combined with also a reluctance to buck the standard of care – that prevents them from learning their mistakes. The challenge is to make that transition, but obviously, you’re open to...

**MG:** Yeah, it’s tough. We physicians are probably the absolute worst about becoming fossilized our beliefs. To some extent, I don’t want to castigate physicians, for I’m one of them. It’s because we do a scary job. I mean, if we mess up, people die.

**DM:** Especially, in your job as an emergency room physician. That’s probably one of the few legitimate uses of the traditional medical modal, from my view.

**MG:** Yeah. To some extent, emergency physicians and all physicians, not only are you held accountable for the stuff that you do, and a patient can die. You can do the very best that you think needs to be done for a patient. Because of their non-compliance, they can end up dying, yet you’re still held liable.

Secondly, there are huge forces at work within medicine to establish standards of care, which then become medical legal standards of care. Right now, Medicare will punish you financially if you don’t follow their core practices. So what is Medicare with chest pain for ruling out angina, and they are found out to be coronary heart disease. It is the medical legal standard of care that they get discharged on a statin. Even though the vast, vast majority of medical literature says it does nothing – if anything, it’s probably harmful.

But there it’s been established through the third-party payer system that this is a standard of good practice. If you discharged someone and, because of your understanding of the literature, you personally did not put them on a statin: number one, they are not going to pay you; number two, if the person has a bad outcome six months later, their attorney can say, “Why didn’t you put this person on a statin?” If it’s established as a standard of care, you’re in a very precarious position. A lot of what drives physician behavior is not based on science. It’s based on the legalities of medicine and theory it generates.

**DM:** Yes. Thank you for explaining that so adequately, because it is a big challenge and many people fail to appreciate that. They just think that a large number of physicians have bought this theory, hook, line, and sinker, when in actuality there’s a significant percentage and perhaps even a majority who don’t accept it are really just forced to do it because of the items you just mentioned.

**MG:** Yeah. Let me tell you this (I won’t even mention the spatulate, because someone could back-engineer it). When we dictate our charge now, a lot of voice recognition systems are being used. For a complicated word, you can train the system to use a substitute word when you’re doing your dictation. For instance thrombophlebitis can be
changed into “dog.” So you just have to dictate “dog” and it will transcribe thrombophlebitis.

This physician who as a part-and-parcel of his practice has to prescribe statins to his patient, when he dictates Lipitor, Zocor, or whatever statin he’s going to use, he substituted his word recognition software with the term “Satan’s asshole.” [Laughs]

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DM: [Laughs]

MG: There are plenty of physicians that don’t believe in this paradigm, but are forced to use it. I would advise your listeners that I think the only way for a primary care physician to really practice good state-of-the-art medicine now is to actually completely opt out of the third-party payer system, particularly the governmental systems of Medicare and Medicaid, and create a practice where he just directly bills his patients without accepting any third party payment and then allowing the patient to file medical insurance on their own. That will give them the intellectual freedom to practice the way they wish to practice.

I would seek out those kinds of physicians, because there lots of them that are starting to opt out in that way. It’s a scary thing to do, but the ones that have done it have found very significant success doing so.

DM: Yes. Thank you for your sage advice, and thank you for mentioning that. That’s an important point that we frequently tend to ignore. I would certainly echo your recommendation. I think that would provide our listeners with access to a physician, because we all need health coaches and consultants who know more than we do to track and certainly monitor any necessary medications.

MG: And the cost of care goes way down when you do that. You don’t have the overhead of having to file. All of a sudden the transaction is occurring directly between the provider and the recipient. You can negotiate for the price. Typically, an office visit under that model is 35 dollars.

DM: A much better system. Something that hopefully will move towards challenging the healthcare situation we have right now. But let’s get back to the exercise.

MG: Okay.

DM: I have some other questions with respect to some of the specifics, because it’s a little bit of a challenge to suit yourself in the literature. I’m sure you probably have some really great insights on this. One of the observations I have made in participating is since I started working with Phil Campbell’s work (he has a program called “Sprint 8” or “Peak 8”) is its eight repetitions of what I mentioned earlier. I wonder if you could comment on the number of frequency and the specific amount of training. Is there any magic with doing eight repetitions for a total of 20 minutes of workout or four minutes of exercise versus half of that – like four repetitions – because it’s really difficult to discern from the literature.
MG: Yeah. Right now I think that number eight is just kind of arbitrary. I think it was probably chosen to some extent based on the work of Tabata, the Japanese exercise physiologist that created high-intensity interval training for their Olympic speed skating team. I think what happened is after about seven or eight cycles of that type of high-intensity interval, you have finally accumulated enough fatigue where the performance drops off to such a level that you can’t go on.

I think that is what I call a “dose response” way of measuring things. The intensity of the exercise needs to be high enough, so that you can’t stand anymore that you’re giving up now. With that particular modality being used, somewhere in the realm are seven or eight repetitions – that’s maybe about all that you can stand, which determines the dose of the exercise. That also therefore determines the amount of [43:48] with the body’s resources that have been made and therefore somewhat determines the appropriate recovery interval.

I think where it falls down and what needs to be done is people need to figure out – not only mammothly figure out – how much can we stand. We need to figure out how little do we need. In my experience doing a Tabata-type interval protocol, I found that the results in terms of response do not diminish at all when you cut back from eight down to five rounds. That begs you to say, “What are the other three rounds for other than taxing my recovery ability unnecessarily?”

DM: That’s a very important point, but from a research perspective… Well, first of all, Tabata, from my understanding, is 20 seconds of high-intensity and only 10 seconds of recovery.

MG: Correct.

DM: It’s a bit different, far more extreme, and is so intimidating. I never even considered trying it, because I was dreaded how badly I’d feel after doing that. But the one I mentioned has a bit longer – recovery at 90 seconds, which allows you to do the eight. I’m wondering from a literature perspective, are you aware of any studies that show the benefits that we see with high-intensity training at less number of intervals?

MG: Not specifically. No. Once that paradigm has been established, they kind of used that framework in which to construct additional studies. That’s the way you have to take pilot data to create your thesis, but then that kind of traps you in the scientific world from any true experimentation. That’s why it sort of had to be done on an individual basis, and then the pilot study redone, then other studies done after that. I don’t see that that’s accumulated yet.

My own data with our own clients and my own experimentation suggest that it’s probably significantly less.

I think more important than that is what you’re doing there that is different than what I advocate with the type of training that I carry out is you’re just picking a particular level of exertion and you’re trying to find out how many repetitions of that will produce an adaptation. But the truth of the matter is the human physiology, in particular the human skeletal muscle, is enormously plastic. It will adapt to whatever protocol you throw at it.
So what you’re not measuring may not necessarily be a global improvement or adaptation, but may, in fact, be a specific adaptation to the protocol that you’re applying. I think more important is to actually carry out exercise in a way that tries to produce a rapid and deep level of fatigue in the most efficient way possible, which means that the time that you are going to be spending training is going to be limited by the intensity of the exercise. Then you are certain that you brought an intensity of stimulus to the body that’s going to demand an adaptation.

In a dose-response way, because the concentration of that stimulus is so high, the adaptive recovery interval gets pushed out somewhat. What you’re doing is you’re finding a most efficient way of producing a physiologic adaptation.

**DM:** Thanks for confirming that, because I didn’t think that there were studies done that show they’re documented. I didn’t fully appreciate it because of the entrenchment of this thought process that makes it difficult to escape from it. That’s very clear, and you confirmed what my beliefs were on this.

I’m wondering if you can provide us with the framework of developing simpler principles. Let me just share my experience with you. I was doing Peak 8 for a year or so, and I realized that I was doing it three times a week. Then I gradually decreased it to once a week, because I dreaded doing it. I would push myself to a point where I was ready to throw up. It was just so much pain that I could not bear myself to do it again, so I gradually did it less and less.

Then I recently re-interviewed Phil Campbell and he helped me appreciate the importance of doing it three times a week, because you’re going to get this spurt of growth hormone. Then it occurred to me that I can’t do it three times a week, but I can do less numbers of intervals. I can do it less intensely and do it that frequently.

First of all can you comment on that, but also more importantly provide us with the framework of principles that we can do to adapt it, apply it, and achieve the results we’re seeking to?

**MG:** Yeah. I think part of where I might disagree with Dr. Campbell is that what happens is you get locked into thinking that the organism has a static system, that what is applied at the beginning needs to continually be applied even as the organism’s physiology is changing.

What I’ll tell people – and what my experience has been – is that when a human body has an appropriate metabolic conditioning, and the musculature has been appropriately strengthened, if that person has adequately recovered, you almost cannot contain them in terms of being active. Something about what I term “an active genotype gets woken up and you can’t hold them still.” The only way that it will not express itself is if that person’s body is overtrained in terms of intensity relative to frequency. If the intensity is very, very high, the frequency has to be less and less. In fact, for any interval increase in intensity, there has to be a very disproportionate decrease in frequency for it to continue to be productive.
Initially when you first start doing that sort of protocol, you’re not very strong. In any individual session, even though it feels like hell to you in terms of the amount of metabolic and mechanical work you’re producing, it’s not that great. Twelve weeks later, the amount of mechanical work that you’re able to produce in a single session (even though you’re better-conditioned), may not feel as bad to you as it originally did. The amount of metabolic and mechanical work that you’re now doing may be two to three times as what it was when you started. The amount that you’re body has to recover from has increased that much, so you’re recovery interval needs to be spaced out.

If you’re going to keep doing it three times a week as if you’re a beginner that was weak and not able to bring that much stress to the system, you’re going to flung yourself out. You need to space it out every fifth day once your capabilities rise, because you’re bringing more punishment to yourself, because you’re more capable. It’s a dynamic process. It’s not a static, fixed thing.

The whole notion of the growth hormone spurt becomes very important for a person who’s deconditioned and that’s lost their fastest-twitch motor units in their skeletal muscle that demand that. But just the presence of having an improved metabolic condition and more fast-twitch muscle cells – just having that there – will augment the normal diurnal secretion of growth hormone that occurs and that should be occurring on a natural basis but is afterfeed in most people.

Because you needed it three times a week to get that spurt, when you were early on and deconditioned does not mean you need it when you’re in excellent condition. By the time you’re in excellent condition, you already have the muscle tissue that drives the very large diurnal spike of growth hormone anyway. You only need that extra kick after you have fully recovered, which will be much less frequently.

**DM:** Wow. That really is a profound insight, and I thank you for sharing that. So you’re speculation is that once you’re fit, you don’t need this relatively frequent spurt of growth hormone production by this exercise, and that to recover becomes more important. That the range could be anywhere from three to five days, maybe even a week?

**MG:** Correct. Not only do you not need it – you need to not do that. Okay, go back to medical school and I’ll tell you really, your adrenal gland looks like a little triangle-shaped thing that sits right above your kidneys, and it’s arranged in layers. On the outermost layers, you have mineralocorticoids that control your sodium and your electrolyte levels. In the middle layer, you have your corticosteroids that control sugar and generate stress hormones. And in the innermost layer is where you generate growth hormones and the sex steroids, or that’s involved in the axis, in the feedback loop that generates that.

The old saying in medical school to memorize the three layers is “salt, sugar, sex” – the deeper you go, the better it gets. But you got to remember, that adrenal gland is an integrated organ. Those three layers are not perfectly divided.

If through high-intensity exercise you’re trying to hammer that adrenal gland three times per week, but now you’re much stronger and your body hasn’t fully recovered from your
Monday session and you come back and hit it again on Wednesday, guess what—
you’re going to tap down into that deeper level. Instead of growth hormones spurt, 
you’re going to get in a cortisol spurt. You’re going to completely undermine what is it 
that you’re after.

In this changing paradigm of a body that’s much more capable and that can bring more 
punishment to itself, if you do it too frequently, you’re not going to get the growth 
hormone spike that was measured in that six or 12 week’s study. You have been doing 
this for 30 weeks now. You’re much stronger. You do that again on Wednesday. You’re 
not going to get a growth hormone spike; you’re going to get cortisol spike. You’re going 
to head into an overtraining syndrome and completely do the opposite of what you’re 
trying to achieve.

**DM:** Thanks. Let’s get into some really specific recommendations. My understanding is 
fast muscle fibers take at least 48 hours to recover. The basic strategy is you should 
really never do two high-intensity training days in a row or consecutively. You should 
always have at least one day off. Would you agree with that?

**MG:** That’s the starting point. Yes. That’s kind of where Arthur Jones started, but that 
was in the context of the 1970s where people were training six days a week and many 
hours per day. Yeah, for the bare minimum starting point that would be true. That would 
be true in an acute status, meaning if you just said, “Okay, I’m going to take a pause. 
I’m going to train in the day,” – brand new, right-out-of-the-box– “I probably shouldn’t 
train again for at least 48 hours.”

But you have to remember that as you’re improving and getting stronger, the physiology 
is dynamic and changing overtime. What’s going to be required is to change recovery 
time as well. What you’ll find is as you get stronger the percentage of your muscle mass
that is going to be accounted for by that fast-twitch fiber that requires more recovery is 
increasing relative to other types of muscle mass. That recovery interval is actually 
going to go for three days, five days, and further as your conditioning gets better.

**DM:** I’ve got two questions from that comment.

**MG:** Okay.

**DM:** First of all, are you aware of research that shows that you can actually change and 
increase the percentage of your fast-muscle fibers, which, from my understanding, is 
really the ideal type you would like to have more of and the one that we tend to diminish 
as we age. And if you are aware of the studies, can you site the percentage of 
increases that are reasonable to strive for with a good conditioning program?

**MG:** Well, that’s not exactly how it works. The fiber type mix that you have is fairly fixed. 
What ends up changing is the metabolic behavior of the fiber types, and the 
intermediate type fibers, not the slow-twitch type ones, not the fast-twitch IIa or IIb, or 
even IIx, which are the most extreme fast-twitch that occur in genetic freaks like 
Olympic sprinters but also occur in people that have become paralyzed. It’s an odd sort 
of motor unit that takes over. All that aside, what I’m trying to say is you’re not
necessarily making more fast-twitch fibers. You’re growing those fibers. They become larger, so the relative mass compared to the rest of the muscle is increased.

Secondly, the intermediate fibers, they are the ones that has so much specificity. Because depending upon the type of metabolic stress you expose them to, they will either alter their metabolic behavior to become more like the (Type I) slow-twitch fibers or to behave more like the fast-twitch (Type II) fibers. That also creates a metabolic shift, whereby more of your muscle tissue behaves as fast-twitch muscle tissue. It’s a specific metabolic adaptation that’s occurring in those intermediate fibers.

**DM:** That’s terrific. So it’s more of the muscle mass. What type of percentages could you expect to generate it under an ideal conditioning program? What’s the typical average of most people’s massive fast-twitch fiber, something they might be able to increase it to?

**MG:** That’s highly variable depending on the individual. It’s variable based on their expression of certain genes. We discussed this in my book. There are about eight different genes, but probably the biggest determinant is a gene called myostatin.

If you recall, we discussed that muscle is a very metabolically expensive tissue. Your genome has evolved a governor on how large your muscles can become, and how highly expressed that governor is will determine what your muscle mass response to exercise will be.

Regardless of that, your body will shuffle around these different genetic alterations, and everyone gets stronger. Some people get enormously stronger without a lot of change in muscle mass. Other people become modestly stronger with very large increases in muscle mass. But regardless of whether the masses increased or not, what is for certain is their glucose storage capability – irrespective of how impressive the size increases – does increase significantly. That’s the more important thing from a metabolic standpoint.

**DM:** So just like the aspects we discussed earlier in the metabolic system with regards to nutrition and exercise, it’s not so much an absolute size, appearance of the muscle, or even the strength. It’s the metabolic condition that you’re improving, which is difficult to see.

**MG:** Right. That’s the real tragedy that has occurred in so much of the weight training or along the way. So much emphasis was placed on the cosmetic appearance of increasing muscle mass.

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So many people that were not genetically predisposed to express these large increases in muscle mass become discouraged and quit. The reality is those are the very people that probably have the most gain from appropriately performed resistance training. The health benefits are there regardless, but it doesn’t mean you can take a Woody Allen and turn him into an Arnold Schwarzenegger.
DM: Okay. Thank you. Now, with respect to something we mentioned earlier is the recovery aspect. I would really appreciate your comments on this with respect to principles or variables one can monitor to know when, in fact, it’s time to participate in your next high-intensity training session.

MG: Right.

DM: That is the key, because if we rely in some arbitrary number of intervals or frequency of days, it seems to me and in the context of what you just said, it’s somewhat foolish. It’s better the individual has customized it based on where we are at that specific point in time.

MG: Right. Sometimes that can be hard to quantify even with the best measuring tools. One thing I would say for your readers is that I think everyone should be active in a more low-intensity sense almost on a daily basis. If you’re appropriately recovered, it will be very difficult to restrain yourself from being an active person.

But in terms of high-intensity exercise, one thing I would tell your listeners is that you shouldn’t be going onto your next session based on an arbitrary number of days passing or schedule that you’ve set up. When it’s time, you should feel like you’re busting at the seams. You should feel so good that you feel you could turn a car over.

DM: [Laughs]

MG: It’s very important, and I emphasized this in the book. I think it’s very important. You have to remember that exercise is a stressful stimulus that you bring to your body in order to trigger an adaptive response, but that stimulus brings you below baseline. I think it’s very important in your exercise program to set it up, so that you’re spending more days above baseline than below baseline.

Most people want to set up an exercise paradigm, whereby as soon as they have reached some sort of baseline of recovery, they immediately do another exercise session. The theory is that if they go further there will be some decompensation, but that’s not the truth at all. Once you’ve filled the whole backup and piled a little bit more dirt on top, you don’t kind of hit it again immediately. If you wait, your body will pile some more and more and more. You really shouldn’t go back to exercise until you really feel like you’re busting at the seams.

Now, what we use in my training facility is just very excellent record-keeping. We monitor the resistance. The client has completely blinded. They don’t know how much weight we’re using. They don’t know the amount of time that has transpired before they reach muscular failure. We make certain that their form is impeccable, so they’re not showing improvement by cheating. They completely blinded to all these.

What we use as our metric is if the person is fully recovered, they should be stronger. What we want to see is a documentable improvement in resistance or time until they reach fatigue, or both, on every movement of the session. If we’re not seeing that, then we feel that we have not allowed them an adequate recovery between sessions. We
use that sort of feedback. What we have discovered overtime is that most of the population will have reached that point by around the fourth or fifth day.

DM: Wow.

MG: Almost everyone is still within that realm by the seventh day. That’s why we chose once a week: just to make scheduling convenient at the facility when you’re doing 120 workouts a week. But there are some people with less robust recovery systems or more stressful lives: people that may work rotating shifts or night shifts, or may be having a particular stretch in their lives. We found people that don’t fully recover for 10, 12, or 14 days. If that’s what we find, we don’t shy away from it. We just say, “Okay, that’s what we’re going to do then,” and it works like a charm.

DM: Wow. You’ve had enormous clinical experience on this. You have been doing this for over a decade, and you have carefully kept meticulous records. From that experience, you found that it’s very unusual to raise the point of recovery before three or four days. Most typically, it’s five days and can be as long as two weeks.

MG: Correct.

DM: Okay. That brings me to another question. Are you recommending that they don’t do any exercise in that recovery period, or do you recommend that they just refrain from high-intensity training?

MG: Right. That’s an interesting question, because that is what brought up in my mind the concept of this active genotype residing within the genetic expression of the muscular tissue.

Let me give you some background for that. My place is a super-slow facility. I was involved with super-slow all the way back in 1996 and 1997 when I opened my place. Their general approach was that type of training was the only thing that was called “exercise.” That it’s the only thing that you should do, and all other exertional activity of any type needs to be severely curtailed so as to augment recovery, so that you getting the most benefit from what we considered “real exercise” is possible.

I tried to apply that concept and paradigm with my clients. What I found was that it universally failed. Within about six to 12 weeks, my clients were all taking up hiking, playing ultimate frisbee, going back mountain biking, saying, “Oh, I want to run a 10k.” You literally could not contain them. I started to think that these people just have a neurotic addiction to exercise. They just literally cannot believe that we can train this infrequently and produce these better results.

I was attributing it to their psychology, but I was also experiencing that urge in myself that I was trying to beat down. Beating down that urge to be active – to me, I started to realize that it was ego despotic. It didn’t jive, something was wrong. What I came to realize is that, here I was taking people’s Hugo bodies and turning them into Ferraris and saying, “Okay, now you have to spend your life driving nowhere but school zones.” What I started to realize is that all of a sudden I woke up their body’s capability and they
want to express the joy of having a fully functional human body. That is very hard to contain, but it’s also very beneficial.

Lower-intensity activity levels done on a significant volume, in my opinion – as long as it is done spontaneously – is a very beneficial thing. I have found that it does occur spontaneously. You wake up the active genotype, and these people become like a tiger facing on a cage if you try to refrain them from it. My point is to actually start them off: appropriately condition them, get them strong and metabolically capable, and all of a sudden spontaneously they will be taking care of those sorts of activities themselves.

**DM:** So, there’s no necessary formalized program?

**MG:** No. It’s not required. People will just start doing it. Sometimes they’ll do what appears to be a formalized one like, “Oh, I want to do some strength intervals” or “I want to go out and so some sprints,” or “I’m going to do some hill sprints on my bike” and they schedule it in. But really, it’s coming from this spontaneous urge to be more active. Once you become strong and metabolically capable, you just intrinsically want to use it. I call that “waking up the active genotype.”

Now, I don’t have any sort of discussion trying to refrain my clients from exercising. I just say, “Any form of exercise beyond this on a planned or scheduled basis is not necessary – but in six to 12 weeks, you’re going to find yourself wanting to do stuff and when that happens go for it.”

**DM:** Okay. This is really a profound and important principle that you’re outlining. It goes back to the importance of the recovery principle. So your suggestion is that a person exercising – I think anyone who’s really passionate about exercise runs the very serious risk of over-exercising. We’re speaking of this specifically, not the typical American who’s not exercising at all or even appropriately doing ridiculous cardio that’s not providing the benefits that they need. If that type of individual who’s at risk of over-exercising, if they don’t feel that spontaneous urge to do something extra, they should honor that as perhaps a very significant clue that they’re over-exercising and need more recovery.

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**MG:** Exactly. Our genome has millions of years built into it to give us feedback about when we should be active and when we need to rest. But I think this is born out of a misunderstanding in people’s minds of exactly what exercise is. What drives this neurotic behavior is the belief that the exercise directly produces a physical change in the body. That’s what drives the “more is better, or “I need to do something today” mindset.

What you have to understand is that exercise, like medication, is actually just a stimulus. You bring the stimulus to your body that’s perceived as a physiologic threat. Having received that stimulus, your body then synthesizes the adaptation. It’s your body that makes the change, not the exercise itself. The exercise is simply the stimulus. That needs to create a paradigm shift in people’s minds, where they realize, “I need to apply a stimulus that’s severe enough to demand an adaptation. But then I got to get out of
the way and let my body do it.” Once your body has completed that adaptation, you will be above baseline. You will feel much better than you did before you applied the stimulus. It will be hard to contain yourself from being active.

If you get in the habit of applying your exercise as a stimulus, bringing something meaningful to your body, and allowing yourself to fully recuperate, you will literally be astounded at how good a human can feel. Once you feel that, you will be as active as an animal and as our hunter-gatherer ancestors used to be, because you will have the urge to do so.

But it has to occur as a consequence of having that sort of physical condition, not as a pre-requirement of it. You can’t reverse that relationship. It’s like pushing with a rope. You can’t have high levels of activity to produce this feeling. This feeling has to drive the high levels of activity.

**DM:** I can’t really express the enormous amount of appreciation and gratitude that I have for you sharing this. It really is an incredible insight. I never fully appreciate it before. I will absolutely be incorporating this in my recommendations, because it’s such a profoundly basic and fundamental principle of exercise. I think I have never encountered anyone describing it like this before. Maybe it’s because I have been ignorant, blind, or I’m just not aware of it.

**MG:** It’s a docile way of thinking about exercise. This is what drives me crazy when I watch shows like *The Biggest Loser*. In that whole relationship of the high activity level with a healthy physiology, to try to watch them reverse that cause-and-effect, to try to generate it, and to try to reverse-engineer that relationship by taking these morbidly obese people and making them do these ungodly amounts of activity level, thinking that it was that high activity level that created this healthy robust animal, and not the fact that there was a healthy robust animal that is part of how he naturally felt have these high activity levels. They thought that the high activity levels produce the healthy robust animal, when, in fact, it’s a healthy robust animal that generates this activity levels. You cannot reverse-engineer it.

**DM:** It’s an interesting concept. Let’s get into some more specifics of exercise. I just want to confirm some of these principles you’ve mentioned, because my experience of high-intensity training is more of the cardio type – the elliptical or the recumbent bike – as opposed to strength training. Would you say that the principles are the same, whether you’re engaging in a more traditional cardio high-intensity training versus weight training or a resistance training to achieve that, and that basically it’s the same scenario to achieve both types?

**MG:** On the metabolic side of the equation, they’re very similar. Because what you’re doing is that you’re producing metabolic byproducts of that fatigue, in particular lactic acid. You’re moving quickly from one movement to the next or through cycles of a particular movement in the case of interval training. That lactate begins to stack up in the system, and that generates the whole cascade of metabolic adaptations and improvements that make you more capable.
The difference is in the type of training I advocate, that metabolic stacking of these byproducts that fatigue occurs as a consequence of something even more important to the active genotype. In interval training, this is occurring as a side effect of the activity, whereas in the type of training I’m doing, it’s occurring as a deliberate goal of what we’re doing. That goal is to momentarily and deeply fatigue the starting level of strength of a given muscle group.

What we’re trying to do is we are trying to pick up the movement that will involve several large muscle groups, and then rapidly and systematically deeply fatigue all the fibers of those muscle groups in a span of 60 to 120 seconds.

What that experience tells is the levels of muscular fatigue that occurs so rapidly and so deeply that it’s very threatening and bewildering. The important component of this is that it concentrates the key stimulus of exercise, which is the momentary weakening of muscle. If you’re recruiting and working muscle aggressively, you’re going to fatigue it deeply and quickly. That is where the stimulus for adaptation is truly located.

In the type of training I advocate, that is gotten deliberately and very profoundly. When you’re doing a high-intensity aerobic interval protocol that is done as a side effect of what you’re doing. It’s not nearly as deep or as profound and it’s mixed in with all these different components. Unfortunately, some of the other components are the high forces involved with that level of exertion.

The type of exercise that I do I like to liken to a good tanning bed. You can go out in the sun and get a tan, but it’s going to take you (being out in the sun) an hour, an hour and a half. What’s triggering that tan is the act of only one part of the spectrum of light, and that’s the UV radiation. It’s triggering the melanocytes to activate and produce the tan. You’re also getting a lot of atmospheric radiation that may not necessarily be adaptive, and it takes longer. With the tanning bed, you can get a UVA or a UVB tanning bed, and in a matter of six to eight minutes you’ll get as much tanning stimulus without the other radiation components involved in it that could be more damaging.

That’s how – I think – how I apply exercise. I’m going after the inroad or the momentary weakening of the muscle. If I do that very aggressively, I’m going to stimulate the muscular adaptation that’s going to improve the metabolic capability of the muscle and cause it to grow. But as a necessary byproduct of that, I’m also going to have this aggressive stacking of these byproducts of fatigue that demand these metabolic adaptations.

So it’s very similar to high-intensity interval training – only better, because we’re going after the key stimulus directly. But you’re still getting all the benefits that you get from the high-intensity interval training.

Here’s the catch with what I’m doing. You start off lifting the weight very slowly and gradually. The first inch that you move that weight is going to take about two seconds. When you deprive yourself of all the momentum and heat of getting the weight moving under its own power, it’s all you can do to complete that movement in seven more
seconds. Then you lower slowly, barely touching, and then you creep out again. What you’re doing there by moving so slowly is controlling the force.

Force is mass times acceleration. If you deprive yourself of the acceleration, you’re delivering almost no punishment to your joints. There’s no repetitive use injury. The forces are extremely low, and as you become more fatigued, you’re becoming much weaker. So you’re actually delivering a smaller and smaller force to your body as you fatigue.

Now, get yourself on an elliptical or on a treadmill. To get the higher level of intensity, you have to sprint. To do that involves very rapid movement, which brings high acceleration forces to the joints. The higher the intensity, the higher the forces.

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With what I advocate, as the intensity climbs, the forces drop. The harder it is, the safer it becomes. Whereas in any sort of interval training to get that metabolic punch, you have to work with a level of force that can actually get you hurt. If you injure yourself that you can’t exercise, then you’ve really undermined that whole process. The whole “First, do no harm” thing really becomes evident when you look at it in that light.

DM: Yeah, I have been there and I have done that. My first attempts to incorporate that actually resulted to an adductor magnus – a type of hamstring pull – that has been really persistent for four years, until recently I got it resolved.

Part of the reason why I asked that question initially was because of your experience with this super-slow training that allowed you very precise objective parameters that you could essentially establish to know if that person is experiencing a significant recovery. With the high-intensity cardio interval training, you really don’t have that. There are very few parameters you have other than the intensity, number of reps, or your heart rate.

MG: Right.

DM: Even though they both produce similar benefits, your preference and your experience the type that you’re advocating is more beneficial, because it can target more specifically. It’s a direct rather an indirect approach.

MG: Correct, and there’s much more than that. They do produce similar benefits, but the quantity of benefits produced by what I’m advocating is actually much greater. Secondly, on some of these aerobic pieces of equipment, you could have some objective matter. Sometimes some of these pieces – like a concept to Schwinn Airdyne – they actually have a mechanism, whereby you could record your workload done per unit at a time. You might have some objective measure of whether you’re actually showing improvement or not.

But the thing is that level of improvement does cap off fairly quickly, because there becomes a rate-limiting factor that that piece of equipment can only deliver at a certain level of intensity and in terms of muscular fatigue, whereas what I’m doing on the weight equipment is almost infinite. As your capabilities rise, we can keep the demands up to
match almost one to one. Now, that’s more problematic in an aerobic piece of equipment.

DM: Sure. Now, with the interval training I’m familiar with the goal, which is really to get your heart rate up to the calculated maximum which is 220 minus your age.

MG: Right.

DM: Is that something you incorporate with your program, or is it just following the principles?

MG: No.

DM: So it’s not required at all?

MG: Actually it’s not. The thing is that it’s a very bad paradigm. That calculating your target heart range was just completely arbitrarily chosen. I really have no scientific data to back it up. You don’t really need to do a study to determine that. What we need to do is go back to our guidance textbook on medical physiology and I’ll discuss it for your listeners now.

What you’re really trying to drive out of your cardiovascular system by doing mechanical work with muscle is to increase your cardiac output. Cardiac output is a measure of two things. If you remember, cardiac output equals stroke volume times your heart rate. When you do high-intensity exercise, you dump out adrenaline-like hormones – epinephrine and norepinephrine– that act upon receptors in your heart and blood vessels. Under extreme physical demands, cardiac output will be augmented by both stroke volume and heart rate.

Stroke volume is defined as the amount of blood that gets ejected out of the left ventricle of the heart with every heartbeat. But the thing is the amount of blood that can be ejected out of the left ventricle is directly proportionate to the amount of blood that’s returned to the right side of the heart. What happens is when you’re doing a sprint-type exercise on an aerobic piece, the muscular contractions are so fast, short, and choppy that it does not do a good job of propagating venous blood back towards the heart that can actually result in a diminished cardiac return of blood. So if less blood is getting brought into the right side of the heart, less blood will be ejected out of the left side. The stroke volume goes down.

When you’re doing sprint intervals on a treadmill or an elliptical, your stroke volume is dropping, so you’re trying to augment cardiac output by raising only the heart rate. That’s why when you’re doing this sort of thing on an aerobic piece, you’ll see people’s heart rate shoot up in a 180 to 200 range.

But when you’re doing it on my equipment, a lot of people will mistakenly think that it is not as hard, because we’re hard-pressed to get people’s heart rate between 150 and 180. The reason is slow, controlled, and very intense muscular contractions melt very large volumes of venous blood back towards the heart. You get a very enhanced amount of blood returning to the right side of the heart. That also enhances the volume
being ejected out of the left side of the heart. Under truly hard work with intense muscular contraction, cardiac output is probably augmented more by stroke volume than it is by heart rate.

If you try to use heart rate as your measure of cardiac work, a lot of times it won’t be accurate, because what’s really meaning to be measured is your cardiac output. That is the part of the heart rate and the stroke volume. You don’t necessarily know what the contribution of each is. So it’s really a bad, bad measure of intensity or efficacy.

DM: Thank you for explaining that so eloquently. I greatly appreciate it. Would you suggest using your super-slow method and maybe a one-week interval between high-intensity sessions? Would it be reasonable if someone had an interest in cosmetic appearance – especially, some of the men – to increase their muscle mass, to add specific muscle-mass building, strength-type training exercises in conjunction with that? Or is that counterproductive?

MG: That’s counterproductive. The muscle mass that you’re going to build... And this is enormously unpopular). If I could promise people a way to enhance their muscle mass beyond what their genetics would allow, I could be a rich guy, not working in the E.R. anymore (but then I’d have to live with myself.)

The truth of the matter is that any interval increase of muscle mass that you might have above and beyond a very good basic high-intensity strength training program like what I advocate would be so marginal to not be noticed. How much muscle mass you’re going to generate is very much predicated by your particular genetic profile. In most cases, any attempts to try to add additional volume as a mechanism of enhancing your muscle mass stands a good chance of backfiring.

There are some people with a particular constellation of genetic expression that may experience some marginal improvement in muscle mass. For a lot of people, small improvements are a big deal to them. All I could say is that if they want to try it, try it with an honest diet and a tape measure in hand. If it doesn’t work, go back to the basic. If it does, you can kind of take it from there. But for the vast majority of people, it’s not going to make a difference.

DM: That’s a really very important basic concept. Thank you for explaining that. It seemed like your whole emphasis was moving towards that direction. I thank you for confirming that.

MG: What I found is that the particular genotype that will respond to higher volume of work is never really an issue – for me or for anyone reading my book, possibly even for someone listening to us talk – because the statistics and the genetics take care of themselves. It’s such a powerful self-selection process. The people that respond that way have already figured that out for themselves and they’re in Gold’s Gym right now.

DM: Okay. That’s a good point. Would you say it’s also valid to state that really one of the only reasons we need to exercise – ideally with the mechanisms you described – would be because we have transitioned from a hunter-gatherer type of workload, and that basically most of us have desk jobs, and we don’t engage in a regular type of
activity? From your belief or understanding, are there individuals who are still involved in those types of activities that actually don’t need this type of exercise program because their normal daily activities provide it for them?

[----- 1:30:00 -----]

MG: With a few exceptions, there might be. I think you really need to draw a distinction between exercise as a formal scientific concept and activity. This is where I have kind of rubbed a little bit of the Paleo group the wrong way, because when it comes to exercise, they kind of globalized their concept of everything ancient is good. An ancient man, life demanded of him an activity pattern that was of high-intensity. The exercise simply occurred as a consequence or a byproduct of the said activity. Whereas in modern times, almost no one is going to encounter that type of activity level, other than someone working as a primitive lumberjack or something of that nature.

Even then, by directly assessing the physiologic requirements of exercise, you can produce an efficient means of strengthening that actually protects you from the forces of those higher activity levels. To state it differently, more ancient men didn’t need this sort of thing, because it was a natural consequence and byproduct of their activities and daily living. We need this kind of approach to exercise in the same way that someone lives in Chicago, New York, or Canada needs a tanning bed in the winter.

DM: Sure. That makes perfect sense. I thought that we would be in agreement with that. Now, with respect to some specific parameters of assessment – clearly, one of the goals (it would seem) with the exercise and diet approach is to optimize your lean body mass. Do you have any general principles you advocate or recommend for having people make that discernment or distinction? We have a whole different range or gamut of techniques, such as underwater weighing (hydrostatic weighing), DEXA scan, bioimpedance, or just as simple tape measure of your waist size.

MG: Are you asking me how to measure and assess body fat percentage and lean body? Is that the question?

DM: No. The question is: do you recommend, advocate, and advise that this is something we should monitor on a regular basis? If that's the case, what form would you recommend? Of course, the other one I would like to mention is skin fold caliper. Is that something you think is wise?

MG: Not really. Despite of how much a geek I seem to be in terms of being interested measuring and monitoring, I’m not a big measuring guy. I don't advocate it. I tend to like people to assess how they feel in terms of general well-being and how they look in the mirror. Most people – if they’re adequately lean – ought to be able to see a four-pack on their abdominals based on their degree of leanness. But I don’t necessarily advocate tracking parameters or measuring things specifically.

DM: Okay. Thanks. I guess we can go into some more specifics of the principles of the super-slow exercise program you’re recommending. You kind of mentioned some of them with respect to the amount of weight and the principles that you’re using to do this. If you can do that now, that would be great.
MG: What I do is we just try to address all the major muscular structures of the body in a limited number of movements that are simple to perform. The first thing is these are all weight training movements that can be done from the very basic to the very ideal equipment. What we do is we shoot the large movements. We call it the “Big Five routine.” It was chosen simply because of the large compound movements that can cover the major muscular structures of the body.

In terms of machines in my own facility, it would be a leg press; a compound row, which is a rowing motion or a pulling motion on a horizontal plank; a chest press, which is a pushing motion on the horizontal plane; a pull down, which is sort of a chin up type movement, which is a pulling movement down the vertical plane; and then an overhead press or a military press, which is a pushing movement done on a relatively vertical plane. By doing these five movements, you cover almost every muscular structure. So those are the five movements we choose.

The style of exercise – we do a super-slow type of movement or, in its current incarnation, it’s called RenEx or Renaissance exercise. We use their protocol. Basically, when you start to lift the weight you do it as gradually as you possibly can. You barely start pushing on a movement arm. You gradually build up pressure until the weight barely starts moving. Once it barely starts moving, you kind of go very slow for the first inch. It takes almost 30 seconds to move that first inch. After that, you’ll find that you can pretty much push as hard as you want to. Once you start that gradually, you cannot go fast. You’re just pushing hard.

That’s true for a couple of reasons. The first reason is you have deprived yourself of momentum. Most time when people can get a weight, a barbell, or a machine moving more briskly than that, it’s because they started the movement in a snappy way that allows the weight to move under its own momentum – above the motion to stay in motion.

The second reason is that when you build up force very gradually, what you’re allowing to occur in the muscle at a microscopic level is the maximum number of cross-bridges between the protein filaments that produce movement in the muscle. It’s sort of like a caterpillar or a centipede that’s crawling along a surface. If you start off moving very, very slowly, you’re going to engage more legs or more movement arms at the microscopic level. What you have in terms of movement is the difference between a centipede and a millipede, and that also produces very gradual movement.

What the slow movement does is it keeps the muscle under a continuous load. It can never escape being under the stress of the weight, so the fatigue accumulates very quickly. We’ll just have you lift and lower the weight until your fatigue accumulates to the point where you no longer have enough strength to continue to move the weight, at which point we will have you continue to attempt to produce movement even though it is not occurring for several more seconds, which drives your level of fatigue more deeply.

Once that’s done, you carefully set the weight down, and then boom! You move right to the next movement and repeat. Do that and then boom! Do the next movement and repeat. There’s a brief rest, but maybe 10 to 30 seconds between movements. It’s sort
of like the rest that occurs in interval training, but you’re moving from one movement to the next. You’re deeply fatiguing all the musculature of the body and the metabolic byproducts that are occurring drive this profound metabolic adaptation.

Done in this fashion, the workout will typically take 12 or 15 minutes, which sounds ridiculously short. Once you experience it first-hand, you will come to realize that not only is that enough, but also all you can stand. By the end, if someone asks you to do one more thing, you’ll say, “No, thanks.” Having delivered an intensity of exercise that necessitates the session that short, you delivered the stimulus that is going to produce a profound adaptation. But the profound adaptation is going to take four, five, or seven days to fully synthesize. That’s it in a nutshell.

DM: Thank you for giving us that detailed explanation. I have a few questions from that.

MG: Okay.

DM: About this type of process that is responsible for the metabolic adaptation of producing the growth hormone and the benefits we talked about earlier. It would seem – at least from my previous understanding – that your exercise doesn’t specifically activate the fast muscle fibers. I mean, it is by nature super-slow. You’re not hitting those fast fibers.

MG: Yes. You’re expressing a common misunderstanding of what fast muscle fibers are and what they mean.

DM: [Laughs] Please tell me about them.

MG: A lot of people thing that when you’re doing a slow movement, you’re not using fast fibers. The “fast” in fast-twitch refers as much the rate of fatigue as it does to the velocity of contraption. In fact at lower joint angle movement speeds, the fast-twitch fibers are actually much more active.

What you have to remember is that the fast-twitch fibers are largely glycolytic. They have a whole lot of cytoplasm and very little mitochondria, so most of their metabolism occurs from glucose down to pyruvate. As a consequence, they are the motor units that produce a high level of force to move heavy weights and things of that nature. But because they’re glycolytic, they fatigue quickly and recover slowly.

What happens as we carry out the set in the type of training I advocate – and this is an important component of it – is we recruit the types of motor units that you have sequentially. Now, you always recruit motor units in a particular order. The first ones you will recruit will be the slow-twitch. Regardless of whether you’re using a very heavy weight or doing something of low intensity, you will recruit the slow-twitch motor units first. They fatigue slowly and recover quickly.

If the exercise is of high enough intensity and you have to move something that’s heavy or move it forcibly, you will fatigue those slow-twitch motor units very quickly. You will
fatigue them even more quickly than they can recover, which necessitates then tapping into the next motor units, which are the intermediates.

If the work is heavy enough and demanding enough, you will recruit all those and fatigue them before they can recover and still before the slow twitch have recovered. If you have done that, then you will recruit the fast-twitch motor units.

It has nothing to do with the speed of movement. It has to do with the intensity of the exercise and the fact that you have already sequentially fatigued these slower-twitch motor units. Then you will recruit those; that’s in the last one-third of the set that you’re doing, where you’re really tapping and fatiguing those fastest-twitch motor units.

The “slow,” “intermediate,” and “fast” do not refer to the speed of movement they produce. It refers to their rate of fatigue. So there’s slow fatiguing, intermediate fatiguing, and fast fatiguing.

**DM:** It’s an important distinction. We both agree pretty clearly on the type of diet that one should eat to their health and really the importance of it when it comes to exercise. I’m wondering if you can comment specifically, though, on any dietary changes or acute nutrients that you would recommend either including or excluding prior to the exercise session.

My previous understanding was that for post-high intensity workout, it would be really important to restrict anything that would raise your insulin level. That’s one question specifically, and there’s one controversy on whether you should have any carbohydrate before or after to improve the exercise. I’m really curious on what your comments are on this.

**MG:** Right. To some extent, the answer to the question depends on who the person is and what their goals are. From a general global standpoint in terms of how much carbohydrate you eat before and after and whether it can activate the insulin, we have to remember that relative to the high intensity exertion that we are performing, we have a very limited amount of glucose stored in the muscle tissue, like 220 grams.

Once the storage is full, there’s not a lot that you can do to top it off or augment that very much. The idea of carbohydrate loading to improve performance is kind of spurious. We have to remember that the carbohydrate stored in our liver is mainly used systemically in the bloodstream to maintain a stable blood sugar. The carbohydrate that’s stored in our muscle is for onsite use by the muscle itself. It’s sort of like the coal on its engine train that’s used there locally.

The high-intensity exercise will consume that relatively quickly and will empty out those glycogen stores aggressively. That creates a need for the insulin receptor on the surface of the muscle to become more sensitive so it can replenish that. If you want to somewhat augment that capability and that need, there’s something to be said for avoiding an immediate carbohydrate re-feed after exertion. You actually delay it for a few hours before anything of that nature or any substance.
Even that said, if you eat no carbohydrate or whatever and confine yourself to eating meat a few hours after the exercise session, if those glycogen storages are empty, there will be a demand for gluconeogenesis or taking amino acids from the meat and back-engineering them into glucose so that you can refill those glycogen stores. It’s almost irrespective of whether you carb re-feed after your exercise session or not. Your body is going to take care of it.

My personal inclination – because I’m very much about improving insulin sensitivity as a mechanism of optimizing metabolic health and avoiding body fat storage – is I worry so much about carbohydrates re-feeding immediately after a workout. I just eat a good hunter-gatherer type diet and eat again when I’m hungry after the workout, which is usually a couple of hours later because you need some time for your blood flow dynamics to redistribute so that the blood flow that was shuttled away from your gut will return back to baseline so you to eat effectively.

**DM:** Do you need there’s any need of these once-a-week workout days where you have a high-intensity resistance training to incorporate more protein for muscle building or repair?

**MG:** It depends on what your baseline diet is like, to begin with. If it’s more of an adequate one – if you’re eating 0.7 to 1.5 grams of protein over a 24-hour period – over the span of a week, you probably have more than adequate amino acid reserves in your muscle to deal with those fluctuations.

In fact, there’s some benefit to have from mobilizing those amino acid stores out of your muscle and kind of turning them over. There is some evidence in the literature that branched-chain amino acids like leucine and administered shortly after the workout does augment some of that growth hormone response and does somewhat augment speeding recovery. 

So, if someone – either through their diet or through the branched-chain amino acids supplement or sometimes even protein supplements (like what you sell on your website) – in that window think that there is some scientific evidence. You can go to Google Scholar or PubMed, and just type in “branched-chained amino acid,” “whey protein,” or some. You’ll pull out a whole series of articles showing enhanced protein synthesis and growth hormone secretion from consuming that kind of supplement in the post-workout window. Whether I advocate that as absolutely necessary or not on a widespread basis, I really don’t know.

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I can tell you from personal experience, I’m in the level of my training now where I can bring a lot of punishment to myself. I found out that in the first 24 hours, my sense of recovery and how I feel in terms of being below the baseline has significantly improved by taking some branched-chained amino acid supplement after the workout.

**DM:** That’s a very sage advice. Thank you for sharing that. One other question with respect to other types of exercise is in conjunction with the resistance training you described. One area of the body that’s not covered would be the stretching or the
flexibility component. Do you recommend that one incorporates that into the program? It seems that if certain muscle groups are tight, you’re going to be predisposed to injuring yourself either through an exercise program or just the daily activities you have.

**MG:** Right. I don’t advocate stretching in the conventional sense, because number one, most stretching isn’t really stretching, and I’ll explain that in a moment. Number two, with appropriate exercise the stretching is built in. Let me explain what I mean.

If we talk about stretching, what we really mean is the application of force at the safe limits of the range of motion of a given muscle. You can apply force beyond the safe limits of the given muscle and produce more flexibility. But more flexibility is not always better. It can actually produce joint instability to be too flexible. What you want is appropriate flexibility, and what is required is the application of force at the safe limits of range of motion.

We set people up within any equipment, so that the muscle groups in question are moving through their safe range of motion. They’re under the load of the weight, so there’s an application of force throughout the muscle’s safe range of motion. The stretching is built in.

The other problem is what most people think of as stretching, like doing a Hurdler’s stretch where your quadricep is being stretched out on one side and your hamstring on the other of opposite leg, is not really stretching. That’s just a pulling sensation you get from something called insufficiency. What insufficiency means is you’re placing the muscle in a mechanical position where it cannot contract. If we remember the muscle moves, because of you have at the microscopic level, are filaments that interdigitate with each other.

For those who are watching, the top hand is an actin filament, and the bottom hand is a myosin filament. They actually interdigitate with each other and crawl along – that’s what produces a muscle contraction. You can put your muscle in a position where that interdigititation cannot occur. The muscle can either be fully shortened, so that it can compress no more and those interdigititations can’t grab onto anything and move any further. That’s called active insufficiency. Or you can pull the muscle apart so far that these two elements that got to interdigitate with each other can’t reach each other. When you do that, it produces a pulling sensation in the muscle that people misinterpret as stretching.

I’ll show you how to experience that. I’m going to hold my hand up, and as I make a fist in the neutral position of the wrist, you can make a very powerful fist. You can also fully extend the fingers with great force. If you take your hand and flex your wrist down into a gooseneck position as hard as you can, if you then try to make a fist, you’ll find that you can’t make a hard fist. You’ll feel an intense pulling sensation on the back of your arm and a cramping position here. That is perceived by most people as stretching, but it’s not. You just placed the muscle in a position where it cannot contract. When you do a Hurdler’s stretch, you’re doing a similar thing for your hamstring.
Now if you go the opposite direction and you extend your wrist as far as you can really, really hard, and then try to straighten your fingers, you’ll find that you cannot fully straighten your fingers. You’ll produce an intense sensation of stretching here on your forearm. That’s the same sort of the same stretching sensation that you have in your thigh when you’re doing a Hurdler’s stretch.

But it is not stretching. It’s just insufficiency. You’re just placing your muscle in a position where it can’t work, and it really does not do anything to enhance the muscle’s flexibility. You may increase the flexibility, but you’ve made the muscle more prone to injury and you’ve made the joints that it surrounds less well-protected.

Most stretching, as most people think of stretching, is actually harmful. The stretching should be built into the exercise.

DM: And with your program, that accomplishes it?

MG: Correct. Even with calisthenics, if you’re observing an appropriate range of motion, that’s built in. Someone that’s strong and has worked their muscle through an appropriate, normal range of motion will be flexible and will be optimally flexible. Most people where they lack flexibility and why is not because they didn’t stretch; it’s because they’re inactive and they are inactive in a chronic, fixed position. And the vast, vast majority of flexibility problems that occurring in people nowadays are in their psoas muscle.

Your psoas attaches in your inner thighs, dodges through your pelvis, and attaches to your lumbar spine. It’s a cause for many people’s back problems. It’s because of a loss of flexibility in those muscles – they’re tight and drawn up, like a baby crawling up into a fetal position. They’re tight and drawn up not because we didn’t stretch them, but because we’re sitting all the time. They are chronically in a contracted, shortened position but never exercised. So they atrophy in that position and lose their normal flexibility. It’s not because we didn’t stretch them. It’s because we’re sitting all the time and we’re inactive. Appropriate activity levels for any muscle will produce its optimal degree of flexibility.

DM: Would you say the same holds true for core movements? That’s an approach in, I think, pilates would be a good example with something that exercises that. Would your type of program address the core muscles or would you need something in addition to do that?

MG: The whole term “core” is actually a bit of a marketing term, and it works really well because people picture an apple core and what their body to be shaped like. But the muscles in and around the abdominal wall are deeply involved in the movements that we talk about. When you’re doing a leg press, you have to hold your core, for lack of a better term, your core musculature height to serve as a solid backdrop against which push. Same thing when you’re doing a chest press for a row.

When you’re doing a pull down, you’re actually very aggressively activating your abdominal muscles, and you do not need additional abdominal-specific exercises for doing that. Because if you look at the abdominal muscles on the six-pack that everyone
wants, that’s literally just a sheath muscle, and it attaches to your sternum and your pubic bone. It has very little involvement with bending your trunk at the waist. All it really does is it takes your sternum up here and your pelvis down here and slightly shortens the linear distance between the two. Remember, that’s a vertical muscle, and muscles contract in one direction. When it contracts vertically, it produces very little movement. When you’re doing a pull down, the act of stabilizing your torso to pull that bar down is so intensely involving the abdominal muscles that you’re doing all that you can do for them just in that movement.

Now, pilates has kind of marketed itself on targeting the core. But again, a lot of what they are doing is just creating the sensation of pulling in discomfort in the involved core musculature by applying force through the limbs in a mechanically disadvantageous pattern. So you’re actually producing resistance for the core by moving in a way that’s mechanically inefficient and producing some level of resistance. You can produce that level of resistance for the core in a much more efficient way, and you’re not going to be placing your joints in any sort of unnatural position that can actually produce a significant strain to the joint capsule.

**DM:** Okay, thank you for the explanation. Now, if you can just expand a bit on the super-slow with respect to equipment and type of facilities out there. Obviously, you have one in your own fitness center. But is there a national chain that people can acquire. I think, more importantly, are these principles articulated so well earlier, something that can be utilized in a traditional fitness center with traditional equipment?

**MG:** The answer is yes and yes. There’s not actually a national chain that I would advocate at all, but if you go to the website from my book which is BodyByScience.net, there’s a direct read there, and there are very well-qualified facilities scattered all over the country and even throughout the world that are well-versed in applying this type of protocol. I think the best way for a listener to get a representation of what I’m talking about is if they are able to find a place close to them and go for a demonstrational workout. Even if you didn’t stay at that facility because of travel time or cost, it will be worth the trip just to have a benchmark as to what I’m talking about.

Most of the best equipment that you can do this on is high-quality equipment that has what’s called a good strength curve, meaning the resistance matches the force of the muscle at any given point of the range and motion. There’s no bad mismatch or no sticking points.

The second thing is the equipment is very low friction. In order of preference, super-slow systems or Renaissance exercise equipment in some of these facilities are the best of the best. Next would be NEdEX exercise equipment, and probably next on my list would be Nautilus, and then next down the line would be Hammer Strength. There are plenty of different adequate pieces of equipment that you can find in a commercial gym.

Also on the website, there are videos there posted that give examples of the big five workouts so you can see roughly how we’re set up and the equipment, what the joint angles and range of motions are, and what the performance of the exercise and the
experience of the workout actually looks like. It’s represented both with male and female so you can kind of get an idea of what you’re shooting for. Now having said that, you can even get an appropriate high-intensity exercise stimulus by doing callisthenic type movements and producing fatigue in that manner.

**DM:** How about traditional dumbbells or barbells?

**MG:** Yeah. It’s a matter of moving slowly and smoothly and making sure that you’re loading the muscle in such a way it’s as hard as humanly possible with the given piece that you’re working with. The main thing is once you have enough experience doing this on more optimal equipment experience once you know what you’re looking for.

**DM:** Okay. Great. I guess you can do with any equipment, but I think you didn’t really mention some of the more common types of resistance training equipment I’ve seen in gyms, like White Fitness…

**MG:** White Fitness or Sydex.

**DM:** Sydex. So those are lower down the list?

**MG:** Yeah. If they’re well maintained, if they haven’t just gotten a full of rust or friction... They’re lower on the list, but they’re absolutely adequate to experience what I’m talking about. I mean light fitness, light press in a horizontal rowing motion, press, their pull down machine, and their overhead press done in this fashion.

Basically, what I tell people is when you pick a weight that feels challenging to you or a weight that’s maybe 80 percent of what you have been using, when you begin to lift the weight just do so gradually that it takes three seconds to move the first inch. And then just try to keep it moving.

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**MG:** And on any pushing movement before you reach complete lockout, don’t completely lock your elbows so you’re resting on a bone on bone tower. Stop where you’re slightly bent, turn around smoothly come back down, barely touch, barely start, and just try to keep on moving. Just keep doing that, and the fatigue will accumulate amazingly quickly. Just keep doing it until it becomes so hard that you can’t move the weight anymore. Then hop onto the next movement and just go bang, bang, bang, bang, bang, bang. Do it quick. Don’t do any extra. Allow enough rest, and you’ll be astounded how your body responds.

**DM:** Well, thank you for inspiring me to re-explore this side. I had pursued a super-slow training program for about a year (about ’96-’97 or so) and I’m not sure why I stopped. There was a fitness facility not too far from my office. It’s really convenient. It was like two minutes away. But it’s something I’d definitely need to look back into because it really provides very compelling benefits.

**MG:** You’re in Chicago area, is that correct?
DM: Yes. It’s northwest suburbs. At least in the summer and in the winter, I’m in some warmer place.

MG: Yeah, there are some really excellent facilities in your area, and some of the best instructors on the planet are right in your backyard. You’ll definitely get a good representation of what I’m talking about there.

DM: Thank you for pointing that out. So for listeners who want more information, they can go to your website, which is BodyByScience.net, and you’ve mentioned that you have a book. Can you give that information now?

MG: Yeah. The book is Body By Science, and that website is pretty much a blog link to and devoted to that book. There are Amazon links directly off the blog. Just click directly on there and it will take you directly to Amazon. But it’s also available in all the commercial bookstores and everything.

In addition to that, we have a companion book that goes with it. It’s a question-and-answer book, which is several hundred pages of the material that got edited out of the other book posed in a question-and-answer type format. Basically, what we did is we tried to imagine every question that someone might have applying this protocol for themselves, ask the question, and we answer it. I think that book has proven very valuable for people who are trying to apply this paradigm in exercise.

DM: All right. That is also a book that is available through your website?

MG: Oh yeah. It’s published through Amazon as well. When you click the link to the McGraw-Hill book that is on the website through Amazon, you’ll see that it’s also available there.

DM: Well, I thank you for being so generous with your time in answering all of my questions.

MG: It’s my pleasure.

DM: Do you have any closing comments you’d like to mention before we sign off?

MG: A couple of things that we didn’t touch upon that I want to get across to people is that this approach to exercise works regardless of your level of condition. Because what we’re asking, and what we’re doing when you do this type of exercise, is you’re finding what your current capabilities are at that moment in time, and you’re asking 100 percent of your capabilities at that moment in time. So no matter how bad a shape you think you’re in or how deconditioned you’re in, you can do this. You can start doing this and you can do this safely because your own condition is a governor that will prevent you from overstretching yourself.

You can do this safely no matter how deconditioned or how old you are. We have clients that had been as old as 93. Our current oldest client is, I believe, 86 or 87. We are the land of the thrown-away walker where we train people. You can be extraordinarily deconditioned. Just do what you can and get started, because the
genetic code that makes your body able to adapt to physical stress is intact in every living human being. If you apply appropriate stimulus, your body will respond – it’s guaranteed.

So, don’t ever think that you’re too out of shape to start. Just start, and your genome and your body will take care of the rest. Exercise as a stimulus, your body will make the change.

**DM:** Great. And just to highlight a point we mentioned earlier: even with an optimal exercise program into the super-slow Renaissance equipment and the best instructor, it’s all going to be useless unless you’re following the dietary approaches we describe earlier. That is the basic foundational essential. So this exercise is in addition to and not in place of.

**MG:** Exactly. I would also tell your readers that while I made that point, get your diet in order first. Take some time. Focus on one thing at a time. Get your diet in order and start this. I don’t care if you weight 450 or 500 pounds; you can start now and the act of genotype and the vibrant human body that you’re meant to have as your birthright, it’s inside there. All you have to do is unlock it.

**DM:** All right. Well, thank you again. I appreciate all you’ve done and what you continue to be a real pioneer in helping people understand how you’ve utilized this phenomenal resource to really experience life at the fullest potential. You’re really providing a lot of guidance and wisdom to them, and I really appreciate you for doing that.

**MG:** Well, thank you very much and I appreciate that your work has been very helpful to me and very useful for my clients.

**DM:** All right. Well, thanks again. Hopefully, we’ll talk soon and then maybe I’ll have an opportunity to meet you in person one day.

**MG:** I’ll look forward to it.

**DM:** All right. Thank you, Doug.

**MG:** Thank you.