

## [HIT Business Membership - Dr Doug McGuff Live Q&A on Myokines](#)

Lawrence Neal: All right, so welcome everyone to the May 2019 Q & A. Really excited to do this one today. This is Dr. Doug McGuff's first appearance on the [live Q & A in the membership](#). So thanks Doug for taking the time to do this. Really appreciate it.

Dr. Doug McGuff: [inaudible 00:00:15] It should be fun.

Lawrence Neal: And thanks for showing up early too. I know you run a tight ship, so appreciate you...

Dr. Doug McGuff: I always plan for things to have a little hiccup, so this one didn't, I'm happy to say. So I'm a little technically challenged so I just play it on the safe side.

Lawrence Neal: That's always wise. This is, I think I've probably done about eight or nine of these now, but it's quite challenging. The software is quite technical but each time it gets better which I'm pleased to say. So the topic we're going to focus on today is myokines. And I can imagine this could get quite technical but luckily everyone who's on this webinar is fairly smart, so I'm sure everyone will be fine in terms of trying to understand everything. So we've got an hour. I know you need to wrap up just before the end of the hour and I've narrowed that down so I make sure we do that.

Dr. Doug McGuff: Okay cool.

Lawrence Neal: To everyone listening if we can keep the questions related to myokines, that'd be great. Obviously myokines is a huge topic, and I'm sure we'll go in all sorts of different directions. But if we could keep it under that theme, that would be ideal.

And the way we're going to do this is if everyone can either type in the chat pad if they have a question, or click the raise hand button on their control panel. And what I will do is I will actually unmute participants and then they will ask a question. I'll probably imagine there might be cases where you ask a question and maybe Doug asks a question to clarify, and there's a follow up question. But if we can just be respectful of everyone on the call and make sure everyone gets an opportunity to ask their question, that would be great. And I also appreciate that many of you will be listening passively and that's fine as well.

So I figured a good way to start this Doug before we start getting questions from attendees, would be to just get a definition of what myokines are exactly. Because there might be some people listening to this who have absolutely no idea. And it would just be good to set the scene in that way. So do you think you could just run through a definition and set the scene for us?

Dr. Doug McGuff: Sure, I'll try to keep it as simple as possible. Myokines at their most basic are just chemical signals that are released from contracting skeletal muscle that signal other tissues. And that can happen in one of three ways. It can be autocrine, meaning that it just circles right back to the tissue from which it was secreted, to give some sort of message about the status of the operating tissue. Paracrine, which is something that is signaling a very nearby tissue, something sitting directly next to it, or even another muscle group. This may be

an example of Arthur Jones' description of the indirect effect, whereby training your legs very heavily with squats can affect the circumference of your arms through a paracrine [inaudible 00:03:10]. So it's signaling nearby similar tissue. And then the third type of signaling is endocrine where you're signaling to entirely different systems of tissue elsewhere in the body. So these chemical signals that come out of skeletal muscle are sent out to control the behavior and actions of other tissues in the body.

Lawrence Neal: That was excellent way to kick this one off. So for everyone listening, if you have any question whatsoever, please feel free to either click the button to raise your hand, or type in the type pad on the control panel where it says questions, and I will actually unmute you and give you the opportunity to ask Doug any question that you might have on the subject of myokines. So while I'm waiting for people to raise hands and type in the type pad, I will ask my question of you first Doug. It's quite a big one so are you ready for this? How has learning about myokines altered if at all, your recommendations of regard to exercise?

Dr. Doug McGuff: That's still evolving. Here's the problem with myokines right now, is it's relatively new. The term first really got defined by Bente Klarlund Pedersen in about 2012, 2013. So it's still a relatively new field. And if anyone's been geeking out and following along on Pub Med or any of the Google research sites, and kind of just plugging in myokines in the search engine, what you will find is that the field is really blowing up

right now. Which is really problematic for someone contemplating writing a book on the topic because I just kind of had to accumulate data for a while, because if I were to put the hammer down and complete a book, by the time it was published it would be outdated. Everything's changing so rapidly.

And what defines this rapid change somewhat is that how we measure myokine effects and when, after a bout of exercise, a particular myokine effect reaches a peak effect is still not known. We just are now in the process of looking at different myokines and selecting them across a span of time after the exercise application determine not only when the peak effect is going to be, but also what kind of exercise has what kind of effect on what particular myokine. So all that's influx.

What I would say to answer your question Lawrence is that it uncovers that getting bigger muscles and getting stronger is just one of the many adaptive beneficial effects that occurs from high intensity exercise. So that is one of the many effects. And the thing that drew most of this into this field, i.e. getting bigger muscles, is actually probably one of the few myokines that works by a negative regulatory effect. So the one thing that we were all after that got us into this field is the one adaptive response that is strongly negatively regulated. Everything else is not negatively regulated. It has a very positive feed forward effect as apposed to an inhibitory effect. So you have to have some muscle hypertrophy but Mother Nature really puts the breaks on it because of the potential

consequences of that. And probably the first discovered myokine was myostatin back around 1997 or 8.

But to answer your question, what I think I would say is that what's potentially changing in my recommendation is to not necessarily predicate all of our assumptions about volume, intensity, and frequency on what is going to best produce hypertrophy. But rather perhaps modulating those somewhat so that you can maximize some myokine effects. In other words it might be beneficial to ratchet the intensity down on two out of three workouts, such that the frequency of workouts could happen a little bit more frequently to get more beneficial effect out of these other myokines. But that's yet to be determined because we don't know if there are intensity thresholds for beneficial effects for various classes of myokines. We may find some that express themselves much more aggressively when the intensity is lower, and the duration is longer, and vice versa. So it's still evolving but I am wrapping my head around the concept that all of our notions about volume and frequency may not necessarily need to be predicated on muscle hypertrophy.

Lawrence Neal: That's fascinating. Okay, so we've got a number of people who typed questions in here, and thank you everyone for being so forthcoming with questions. But I'm going to actually unmute some of you, because I'm going to see how that goes. And so I'll start with Craig because he's been waiting the longest. This is Craig Hubert. So bear with me a moment. How are you doing Craig? Craig, can you hear me okay?

## [HIT Business Membership - Dr Doug McGuff Live Q&A on Myokines](#)

Craig Hubert: Oh there we go, sorry I had to put the mic on. I'm good, how you doing Lawrence?

Lawrence Neal: I'm good, I'm good. Doug is all yours.

Craig Hubert: Okay perfect Dr. McGuff. Just a quick question. So knowing the benefits of myokines, instead of looking at hypertrophy and strength gains as a sole marketing tool when talking to clients, how would you phrase or how would you approach the benefits of myokines when talking to a client that doesn't have any kind of real scientific background that would be, let's say, over the age of 40 where it's not necessarily a goal to get bigger or get incredibly stronger. But just overall playing with kids, grandkids etc.?

Dr. Doug McGuff: Yeah, that's a good question Craig, and it's one that I wrestle with all the time because if you read the stuff and you get out in the weeds, it's really, really neat stuff. But how do you translate that back to the client in a way that's not going to overwhelm them and just make their eyes gloss over. Even talking between us geeks, I see eyes gloss over when I go into this topic. And I'm trying to reverse engineer my way into that discussion, and I guess one of the major things that myokines seem to do is, they're just very complex feedback loops for optimizing the body's energy pathways and nutrient partitioning. So the difficulty in explaining it's value to clients is sort of the difference between turning on your computer and knowing how your computer runs. Being able to go in and look at the motherboard and look at all the things on the

inside of the CPU that makes the thing run. And really you need to understand that component to some degree.

But what the client needs to know is how to push the on button, and why that's important. So I think the on button for myokines is something that's always been self-evident to us but we could never prove. And that is the beneficial effect of resistance exercise seems disproportionate to the amount of work that was being done in terms of calorie expenditure. And it seemed to deny the laws of thermodynamics. In other words, people doing meaningful resistance exercise seemed to produce disproportionately beneficial body composition changes in terms of fat loss and appearance. And what myokines are showing is that there's actually a reason for that. That the signaling for optimal energy balance in the body, the balance between catabolic and anabolic state, between [inaudible 00:12:38] and [inaudible 00:12:41] is all modulated through these complex pathways that myokines signal. So you have pathways that signal for increased glucose utilization out of the skeletal muscle. And then follow up increased transport of glucose into the muscle cell after it's been emptied out.

You have myokines that signal for mobilization of fatty acids out of stored [inaudible 00:13:13], out of stored body fat depots. You have myokines that signal for increasing the efficiency of that process. You have myokines that signal for the increased utilization of the fatty acids that have been released from the fat stores. You have myokines that convert

white adipose tissue that basically creates energy in the form of ATP and signals inflammatory cytokines, and converts them into brown adipose tissue where the mitochondria gets uncoupled from energy production and just throws off heat. All of those things optimize for a more ideal body composition.

So I think the way to present it to the clients would be to say, "look this sort of exercise doesn't just make you stronger, it sends out signals to all the tissues in your body to organically and almost automatically orient towards an ideal body composition for the organism. So by doing this kind of work, you're sending out a signal that necessitates that your body compose itself as ideally as possible. And that's the simple on button there. There are a myriad of chemical signals that are going out, that are going to make it easier for you to achieve an ideal body composition as a spontaneous and organic event rather than one that you were trying to cajole and force by wearing your Fitbit and taking ten thousand steps and fill in the blank".

Craig Hubert: Okay, that's perfect, thank you very much.

Lawrence Neal: All right. Great question Craig. Appreciate that. It's great to get something that the listeners, the members, can take back into their studios, and when they're talking to clients. Okay Richard, I'm going to unmute you if your mic is working? And so you can ask your question.

Richard C: First of all, can you hear me? No, it says I'm muted.

Lawrence Neal: Yeah, you're good, we can hear you Richard.

Richard C: I can hear you. Okay good. So you mention about negatively regulated, and I have a two part question, maybe stringing a little off of myokines. As you know, I just started training people, and I also got a body composition tool. And I guess one of my parts of my question that I had typed in was, use the term negatively regulated for muscle hypertrophy. And I've kind of pondered whether the reason there's not a lot of real big people around is that evolutionary speaking, it was not a desirable trait to have. And whether big muscles in some ways is bad for you.

But basically I'm finding that the clients I've started to train, have gotten way stronger in a really short time as far as the weights they're using. But my body composition tool with very few exceptions is showing next to nothing in actual muscle growth. In some cases it's even reversed. And I wondered to some extent, I just saw something recently on mental limiting things, and what not, is that people are at first just getting stronger mentally, are hard to explain how people are not really putting on muscle, per se. Lots of stuff there, but any thoughts on that?

Dr. Doug McGuff: Sure, let's break it down in step-wise fashion. So first what I mean by negatively regulated is not truly negatively regulated, as if this is a bad thing and we're not going to allow it to happen. What myostatin does, and the system in general does, is it acknowledges that there is a cost to skeletal muscle that creates a diminishing marginal utility. So when

you become stronger, there's several components to becoming stronger. One of which is increasing the myo fibular protein content, so just actually thickening [inaudible 00:17:36] and myosin, and growing skeletal muscle. That is a component of it. So the negatively regulated is actually that there is a governor or ceiling on how much of the multiple components we allow that to be. And it also makes the hypertrophy component an adaptation of latest or last resort.

So I believe that your earlier adaptations are going to be, to some degree, enhancing the tensile strength of the myo fibular elements without necessarily increasing their mass. And then also augmenting the neuromotor pathways, the pathway between the motor strip in the brain, the spinal cord down to the motor nerves that are [inaudible 00:18:32] the motor units. So you're going to myelinate those pathways more aggressively so that they transmit more effectively. And then your body learns how to fire those pistons more rapidly and more smoothly to produce higher force output per unit of neural output. So I think what you're seeing is in the early stages, your body is using up all the other elements for augmenting strength before it moves to the adaption of last resort.

Also, I believe that our approach and the form that we use in high intensity training probably augments to some degree those neural motor adaptations fairly aggressively before the hypertrophic adaptations kick in. I don't want to suggest that if you let people have sloppier form that they might gain a

little bit better, but I do believe that there is some kernel of truth to that. That I don't think you have to let things go to slop to evoke that, you just have to be patient. And then realize that these other things have to be exhausted first before the actual hypertrophic response kicks in. And that's a variable across the population. And you got to realize also that being a personal trainer, you're selecting for a population whose genome has pit them to being ones that defer that adaptation as far out and as minimal as possible. Otherwise, they would have seen visible results under their own tutelage and never come to you in the first place. So there's that component to it as well. Finally, it does not mean that any gaining of muscle mass is a negative thing, and therefore bad for you in a health state.

I think the fact that you have pushed your body to the point where it does have to resort to a hypertrophic response is actually a very positive health marker. Not only in the sense that you're maximizing your strength, but also that tissue reservoir serves as a larger glucose reservoir to protect you and to preserve your insulin sensitivity. It's a large amino acid pool that your body can tap during times of emergency, like if you become injured or acutely ill, or you end up in the intensive care unit for two weeks because you had an infection and became septic or something of that nature. So there is a beneficial effect to it. And from an evolutionary standpoint, I think we have to acknowledge that anthropological evidence is starting to recognize that our evolutionary adaptations are not just purely based on

procreation and procreation of the individual animal. But acknowledges that more advanced life forms, such as ourselves, live in social networks. And adaptations within that social network in variation creates an adaptive advantage for the whole collective.

So if you're a tribe of 50 or 100 hunter gatherers, you're probably well served to have someone on the spectrum of being very good at endurance, and not carrying much muscle mass, so that you can persistence hunt an animal to exhaustion or run it off a cliff or into a ditch. And then you probably have some survival advantage to there being a few members of the tribe that are very poor at endurance but are very heavily muscled and able to drag the mastodon out of the ditch, [inaudible 00:22:43] it out and carry it back home. So the fact that there's variation doesn't mean that someone is healthier or not healthier because they carry more muscle mass, or that they are better or less well adapted than another. Because the variation across the species is part of its survival benefit, which is why we see such a spectrum of response to the kind of training that we apply. Now I'll stop.

Richard C: Okay, thank you. I have other questions but I'm sure there are other people on the line. So I'll wait and give other people a chance to see if there's time.

Lawrence Neal: Richard, ask one more and then we'll move onto the next person.

Richard C: So this is a quick one and again, I'm stringing away. You had a video about low back exercise done without a MedX lumbar, in which you were pressing down from the hips and the shoulder blades, all hunching them together and sort of pressing your upper stomach area, for lack of a better explanation, up towards the ceiling type of thing. I just wonder if you're familiar with this traditional superman exercise, where basically you're lying on your stomach and you're bringing up your hips, and what not. It's been called different things. In various [inaudible 00:24:04] books, it's actually been done as well. And some of the superman exercise has your arms out in front of you. It seems like you're sort of doing the same things you're describing, or similar, in reverse. And I just wondered if using the static protocol, using that... Because when I tried yours, I kind of had a hard time feeling like I was engaging those muscles. But when I do the superman, I really do feel that. Any thoughts on that?

Dr. Doug McGuff: Not deep thoughts on it. So the one that I demonstrated on the video was actually taught to me by Ken Hutchens. And that is sort of a time static contraction version of his linear spine extension machine. So it's sort of recreating that movement of pushing your abdomen out. That's where the plunger is and you're pushing it out with fixation of your scapula and your pelvis, creating that intense arch in your lower back to get to those deep muscles. The superman, my impression of it is that you're probably more aggressively loading the superficial lumbar extensors. Or the superficial

torso extensors. You're doing so by use of a very long lever in the form of the arms and the legs.

So I think you probably are more aggressively hitting those superficial lumbar extensors and probably only after significant fatigue, engaging the deeper muscles like the multifidi. Now the one where you're laying on the floor, I think that is probably reaching the multifidi because if you're doing it correctly, you kind of have the lumbar extensor musculature in active insufficiency. They're completely bottomed out. So any further load bearing has to be done by the deeper muscles. And I think that's what's going on there.

Richard C: Okay, thank you.

Lawrence Neal: All right. Just bear with me a moment. Okay, so, Dr. Ben. Ben [inaudible 00:26:15]. I'm going to unmute you now, so hopefully you're all set up to ask your question. Ben, can you hear us? Okay, so Ben might be having some technical challenges. Ben, if you want to type... oh can you hear me?

Dr. Doug McGuff: No, that's me. It's McGuff.

Lawrence Neal: Okay sorry. All right. Ben, if you want to type in the type pad. I also got your email so I can ask questions on your behalf anyway. But, yeah, I'll ask one of your questions. If you have anymore, just put them in the type pad and I'll just mute you for now. So one of the questions that Ben had on email was in regard to... Let's have a look here, this is a good one. Any thoughts on any demarkation between local and global myokine influence?

Dr. Doug McGuff: Yes. So it depends on, and probably what I would tell Ben to do, and apologize to Ben because we've been trying to hook up by phone this week. But he's on the West Coast, and I've been working evening shifts all week long. So he gets done at 7:40pm my time and I happen to be working 2 to 11 all week, so we haven't been able to connect. But yeah, what defines whether the effects are local versus more peripheral, kind of depends on the particular myokine in question because some of them do act on a very local autocrine mechanism. And some of them act nearby, paracrine, some of them act very remotely, endocrine. And some of them do one, two, or all three of those things. It just depends on the particular myokine in question.

What they are involved in on a subsistent level is just all of the things that seem to improve energetics. That seem to improve insulin sensitively. That seem to improve fat mobilization. That seem to improve body composition. And the things that happen, that make that possible, that are basically the enthesitis of the metabolic syndrome are combinations of things that are going on onsite, nearby, and remotely. So it is all three things occurring simultaneously. And if you go to one of these review articles, like right now I'm looking on Pub Med, this one is entitled "Physical exercise educed myokines and muscle adipose tissue cross talks. A review of current knowledge and implications for health and metabolic diseases".

What I would suggest is just go on Google, and put in "Myokine review articles". And you can just kind of go through, and it will take you through all of the different known myokines and what their various effects are. And many of them have effects in all three realms. Both local, nearby, and remote. And in multiple different ways. And these can be metabolic, they can also be antiinflammatory, and they can be antineoplastic. Interleukin 6 is one of the first myokines that was ever discovered. And it is known to be a bad player in systemic inflammation and in carcinogenesis. So when it was discovered as one of the earliest myokines, and they found out that after intense exercise like HIIT, that interleukin 6 went up almost ten thousand fold. That was thought, oh my gosh, this is really a bad thing because this is known to be a bad player. And here we are spiking the living heck out of interleukin 6.

That can't be good in terms of the potential neoplastic risk. I mean are we going to have to put a carcinogen warning on high intensity exercise. But what they came to find out is that when you spike interleukin 6 very high, you end up down regulating interleukin 6 receptors, and therefore chronically lowering interleukin 6 levels. And it has a very powerful longterm antineoplastic effect as a result of that acute spike. So there's lots of context going on with what myokines do and what they need. But to answer his question, it's all three and almost all myokines, with rare exception, have effects in all three realms.

Lawrence Neal: One of the follow ups Ben had on there, which was more of a statement than a question, but maybe you can expand on it Doug, is regarding the [inaudible 00:31:26] relationship [inaudible 00:31:27] myosin inhibits IL6 production. Is that correct?

Dr. Doug McGuff: That I'm not certain of, but it would seem to make sense. So [inaudible 00:31:39] is the [inaudible 00:31:39] target of [inaudible 00:31:40] myosin, [inaudible 00:31:40] myosin therefore inhibits [inaudible 00:31:45]. [inaudible 00:31:46] is a signal that gets unregulated as a consequence of high intensity exercise because that's what's driving the protein synthesis to lay down new skeletal muscle tissue. So you got to think of that in terms of a withdrawal of inhibition. So [inaudible 00:32:14] myosin inhibits [inaudible 00:32:16]. Say it again Lawrence.

Lawrence Neal: So its just regarding [inaudible 00:32:24], IL6 relationship [inaudible 00:32:25] myosin inhibits IL6 production.

Dr. Doug McGuff: That would make sense to me overall if you're accounting for the spike in IL6 that ramps up [inaudible 00:32:43]. So on the overall level based on that acute spike, I believe that that would make sense.

Lawrence Neal: Okay cool. All right, so I'm going to unmute Cass. Just bear with me a minute. Cass, can you hear me?

Cassandra: Yeah, you guys can hear me, yeah?

Lawrence Neal: Yeah, yeah, it's loud and clear.

Cassandra: Okay, so basically I wanted to ask Dr. Doug McGuff specifically on potentially inhibiting myostatin because I have been following about myostatin and even creatine usage. And how even creatine also starts up regulating [inaudible 00:33:35] as well. How this is relate to the overall picture of myokines. And then I have probably another question, specifically on recovery debt etc. etc. But go ahead and start with the first one.

Dr. Doug McGuff: Okay, break them down individually for me.

Cassandra: Let's just start off with myostatin inhibition creatine usage.

Dr. Doug McGuff: Okay. So myostatin is a myokine that is secreted that regulates skeletal muscle growth. It is known, the gene that [inaudible 00:34:26] for it is GDF8, growth and differentiation factor 8. It [inaudible 00:34:32] mostly myostatin. Myostatin inhibits muscle growth. So the decrease in myostatin, or the loss of myostatin, or the diminishing of myostatin, will result in a removal of the governing factor of that, which allows for more muscle growth. So high intensity exercise up regulates [inaudible 00:35:00], up regulates protein synthesis. And through myokines signaling through other myokines, like interleukin 15 is a notable one, interleukin 6 also. When those myokines spike, they have negative feedback on myostatin synthesis. So myostatin goes down. So just the mere act of training and bringing a training stimulus lowers myostatin to allow for the muscle growth to occur.

Creatine is involved in being a phosphate carrier for the ATP that drives that whole process. So through an indirect effect, it positively affects the exercise stimulus that drives the protein synthesis. Now the protein synthesis is enhanced both by the fact that you can perhaps push to a little bit deeper or more extensive state of fatigue as a result of the increased ATP as a result of the creatine supplementation. But also the recycling of ATP, that ATP energy is necessary to turn on the [inaudible 00:36:22] machinery and to turn on the conversion of DNA, the messenger, RNA to protein synthesis to lay down new muscle. So it both affects it from a positive and a negative side effect. So a negative action on myostatin and a positive action on protein synthesis.

Cassandra: Oh okay. So what I'm hearing is that if by, say, supplementation of creatine, right, it will give that extra drive to be able to... As we all know, exercise is inheritability catabolic so if we can increase that certain stimulus, we are capable of up regulating, of driving up that spike in myokines. Is that correct?

Dr. Doug McGuff: Yeah. So that is basically the stimulus that's releasing all these different myokines and stuff. Now, it's not going to have a hugely meaningful effect on myostatin and it's regulation of muscle growth in someone that is genetically programmed to produce a significant amount of it. It may not be that significant amount. Okay. But if something takes myostatin away, if you use genetics technology to eliminate the myostatin gene, or you use known compounds like [inaudible

00:37:58], [inaudible 00:38:00] serum so it cannot bind to its receptors. Then you're going to have the dramatic double muscling that you've seen all over the internet and everything. But to some extent, other actions that you take have a relative effect on myostatin, which it has to for muscle growth to have ever occurred as a result of any form of weight training. That action had to produce a relative decrease in myostatin expression. And creatine is just one tiny contribution, a drop in the pond to the total picture. But it is something that does contribute.

Cassandra: I actually asked about that because I'm starting to actually realize fitness and even pretty much if I were to try to train to become a super soldier or something, right. I wanted to be able to know, okay, what could I potentially take naturally to induce the best training stimulus? And also it leads onto my next question on recovery debt. Is there any benefits on tracking our heart rate variability and knowing when to back off, and when to try to do certain lower intensity exercise to stimulate that recovery zone.

Dr. Doug McGuff: My understanding of heart rate variability is that it is a good metric to use to decide when you're ready for a high intensity bout of training versus lower intensity bouts. And it may also be a good guide for deciding whether lower level activity or lower intensity activity between your HIIT training sessions might augment your recovery. It's a good objective feedback. I have never used it for a couple of reasons. One is because of my rotating ER schedule, my heart rate variability is shot

and I just don't want to ask questions to things I don't want an answer to. The other thing is, is what they have found with heart rate variability training is, if you look at athletes in season, or special operators, if you look at Navy Seals, Squat Team members, emergency workers like emergency medicine doctors. If you look at people that work in chronic high stress environments, and what you find is that their heart rate variability just goes away. Really. [crosstalk 00:40:55]

Cassandra: Just no indication?

Dr. Doug McGuff: Yeah, if you take heart rate variability of special operators, this has been looked at with Navy Seals. Heart rate variability, when you take the beat to beat variability of a heart, and you speed it up very, very fast, it sounds like [inaudible 00:41:14] concert music. Its beautiful. But if you take the heart beat of an operating Navy Seal in a high stress environment. And you take their heart beat and then you speed it up to get their variability, you will not hear any music at all. It is a metronomic, bong, bong, bong, bong, bong, with no variability whatsoever. So chronic stress situations train out heart rate variability. It probably is a negative adaptation that allows them to deal with high stress situations. And to modulate their sympathetic response to an unnatural degree. So that has to be trained out of someone, to be able to modulate a sympathetic response that way.

So special operators that are in a battle field situation, if you read, I can't remember the name. But there's different zones of functioning with regard to heart rate. And when heart rate

gets above about 140 beats per minute, fine motor control goes to heck, peripheral vision goes away. You get tunnel vision and your performance falls off precipitously. The way special operators deal with that is when they are in situations that would make a normal person's heart rate operate at 180 to 220, they are able to modulate that down to 140. But the sacrifice for being able to do that is a loss of your heart rate variability.

So those people, you lose the availability of using HRV as any sort of guide. But for clients that you're training, it probably is a useful metric to decide. But the problem with it is from a practical standpoint is that when you're operating on a schedule that runs on appointments, and we're going to decide whether to train someone or not, based on their HRV. Then your scheduling goes to hell. That's more useful from an individual standpoint than it is from an operator running up the [inaudible 00:43:34] standpoint, because you will most certainly just totally botch your schedule.

Cassandra: Yeah, I specifically asked that because in case of I wanted to have an infictive means of knowing when I can basically go balls to walls, when I go through a high intensity session. And what you basically said about, especially the elite soldiers in military research, it makes me think that maybe it's because they are capable of shifting their bodies into a recovery state much more quicker than normal people. And it also made me think about the idea of using high intensity training in this new type of paradigm of recovery driven fitness.

Dr. Doug McGuff: Yeah, I've thought about that a lot and I don't know that it's anything that they have done or learned how to do that makes them that way. So buzz training for Navy Seals is not training. The physical activity that they do is not to elicit a positive physical adaptation. What it is designed to do is to identify the people that are going to be too weak. And are going to fall out. So what's happened is you have selected for people who can naturally take a lot of abuse and still survive it and function. Doesn't mean that that's a healthy thing. It certainly does not mean it's a trainable thing.

If you take someone that never would have made it through the first 72 hours of buzz training, and you give them optimal training, optimal nutrition, optimal, optimal, optimal. I still don't think they're going to become that kind of person. I think what you've done through the training is select out people that can survive it. [crosstalk 00:45:31] is so successful is, it is an exercise paradigm that selects out for people that don't have resilience to injury. And all of the people that do get injured just fall out and stop doing it, or go somewhere else. But in the process you end up selecting for kind of physically superior specimens, and then hold that up as your success, when in fact you just eliminated all of the weak ones.

Cassandra: I see, so for the most part there's a certain selection bias from what I'm getting. Especially when it comes to the military, we're actually looking at the extreme end of the spectrum of the human.

Dr. Doug McGuff: We always have this fantasy that through proper training, nutrition, rest, and technology, we can turn anyone into Jason Bourne. But it's not true. You have your limits, and what I tell people is that HIIT training is like the army. We can make you be all that you can be, but that's all.

Cassandra: I see.

Dr. Doug McGuff: That's a hard thing to face. And it's something I've had to face myself. With no knowledge and no good equipment, no good technique, and no understanding of [inaudible 00:47:11] are going to out perform the inevitable every physical metric imaginable. And that's just the way it is.

Cassandra: Yeah, that actually kind of makes sense because for the most part, even certain markers like, even your gender or certain hormones circling in your genes is like, yeah there is probably a certain limit of what you potentially may be able to do.

Dr. Doug McGuff: [crosstalk 00:47:42] is also when viewed in the context of a given individual. What any given individual even with limited potential can achieve would impress just about anyone.

Cassandra: Okay, that actually makes sense.

Dr. Doug McGuff: It doesn't mean that you're going to be Jason Bourne, particularly today when the bar is so damn low. What you can achieve for your average individual is so off the chain compared to the current threshold. You'll look like a super hero, it's a super power. So it doesn't mean to not try or give

up because just an average person maxing out their potential is way beyond what most people would even imagine.

Cassandra: Yeah, I actually thought about that as well because there are cases when I just lifted up this 45lb bag with just one hand and I just threw it into the car, and I'm just thinking, what the hell? [crosstalk 00:48:50]

Dr. Doug McGuff: I said this at the Discover Strength Conference at [inaudible 00:48:57], think about that capability in the context that there is a huge swatch of the population where if we have any sort of existential threat or financial crisis comes along, huge chunks of the population will die within two to six weeks. So when you talk about functioning ability and you look at it on that spectrum, we're superstars.

Cassandra: Oh yeah, definitely. I wanted to get HRV checked just because I wanted to track even my own recovery and how I responded to the stimulus. And I'm starting to see that maybe women may recover a little bit more faster than, say, men. Is that correct? I'm thinking it has to do with the hormonal differences especially with estrogen. Is that correct?

Dr. Doug McGuff: Not certain. It's variable amongst some women recover faster, some recover slower than men. In general, I would say they probably recover a little bit quicker and it's simply because with less muscle mass and less strength, the metabolic and mechanical work load that's preformed per workout is just less than a really strong man. So recovery consequences of that are less severe and take less time.

Cassandra: I actually read a specific paper about a man and woman, supposedly they have the same load and same type of intensity, right. And how with women, they are capable of getting even a little bit more reps out and just keep on just grinding it through. And they proposed the idea that we oxidize and immobilize fat a little bit more than men do. With men probably you focus a little bit more on, I guess, the glucose, the glycogen. So what are your thoughts on that?

Dr. Doug McGuff: To answer that question would actually take a study that controls for the variables other than that. It includes in the realm to have enough power to answer the question would probably take in the realm of 10 to 50 thousand subjects to answer that question. When [inaudible 00:51:38] study, there was one subject that took 28 days to get in that positive. And one female that was good to go in 24 hours. The average was about every seventh day. But seven days for the 28th day guy and seven days for the one day person would have been very non optimal. So it's highly variable amongst the population for the reasons we discussed previously about having a spectrum within the population having a survival benefit for each given individual.

Lawrence Neal: All right Cass, I just want to move on to Thom because he's been waiting a fair amount of time. [crosstalk 00:52:22]. Great questions and great discussion. A second. All right so Thom, I'm just going to unmute you, one moment. Hey Thom, can you hear me?

Thom Tombs: Yes I can. Can you hear me?

Lawrence Neal: You're loud and clear.

Thom Tombs: So Lawrence first, thanks for hosting this. And Dr. McGuff thank you for being on. During the breakout session at [inaudible 00:52:48], you had expressed some reservations about I think the overuse of statins. So I've a selfish question here. I have a family history of cardiovascular disease and stroke. And I've been on a low dose of [inaudible 00:53:03] statin for several years. But since the conference I've actually dropped 15lbs by doing some time restricted eating. And my metabolic panel and insulin resistance markers have improved pretty dramatically. I'm thinking that the intermittent fasting creates, or helps create an environment that's more receptive to the myokine messaging. Maybe would you agree with that?

Dr. Doug McGuff: I would agree with that. A lot of the most powerful myokines express themselves, in particularly interleukin 6 and interleukin 15, express themselves much more highly in a low glycogen state. That's why I like to train in a fasted state. Really amplifies that effect. Now with regard to whether you should be using statins or not, it probably is going to depend a lot on your own genetics. And whether your doctor has done proper cholesterol testing or not. And that would involve basically high sensitivity NMR and all the other measurements to determine whether you are one of the rare individuals that makes these small dense LDL particles that penetrate through the interlining of the arterial, the inner lining of the artery. And is more prone to causing [inaudible 00:54:29]

disease. So people with an [inaudible 00:54:35] geno type and high density LDL are the ones that seem to benefit from actually being on a statin. Almost [inaudible 00:54:45] it's probably a net negative.

Thom Tombs: And I think I am one of those rare individuals and one of those lucky few I guess.

Dr. Doug McGuff: It may be worthwhile for you if your doctor selected you for that based on that good data. And you're probably one of the ones that does benefit from the use of that medicine.

Thom Tombs: Okay, thank you.

Lawrence Neal: Cool, thanks Thom. I'm going to ask one [inaudible 00:55:15] of Ben because he's been busy typing away. Ben seems to prefer statements than questions. But let's see if we can decipher this one Doug. And obviously Ben is a very knowledgeable guy so he asks some pretty technical questions. But bring you back to myokines for a moment. So Ben's got one here, it says, "Different [inaudible 00:55:35] recruitment relationship to power of myokine instigation". Question mark. So I'm not sure. I would prefer that to be worded as a question, but does that make any sense to you Doug?

Dr. Doug McGuff: Yeah. To be determined is the answer to that question. There is some evidence that some myokines are more aggressively secreted by motor units that are slower twitch and lower order. So there are myokines that tend to be released more aggressively during lower intensity, more endurance based

exercise. And there are myokines that are expressed more aggressively by the fast width motor units, and therefore higher intensity sprint type exercise.

Which is why marked systems moves around a lot at a lower intensity and intermittently perform intense exercises probably a good prescription because myokines are expressed from all the different fiber types. And therefore at different intensity levels. So that's still something that's being determined right now because in the initial stages, someone just does a study, finds a myokine, and just happened to measure it based on the exercise that was used. But it takes further investigation with various forms of exercise to find out if it might be secreted better under a different protocol. And a lot of that's going on right now. And as that data gets accumulated, we'll know that, oh man if we really want to hit interleukin 15 because we know someone's at risk for breast cancer, we want to mitigate against that. Well that's clearly higher order motor unit, high intensity type training, versus someone with some other metabolic disorder that's much more benefited by myokines secreted by slow twitch motor units. But the answer is that who does what is not out yet. But that's being investigated.

Lawrence Neal: Awesome, thanks Doug. Doug, thank you so much for doing this today. I'm really, really grateful and I'm definitely going to be listening to this multiple times, as I'm sure many of the members will as well. What's the best way for members to find out more about you?

## [HIT Business Membership - Dr Doug McGuff Live Q&A on Myokines](#)

Dr. Doug McGuff: Probably the easiest way is just go to the website in which I do consultation. It also is a website for my facility under the train aspect. But it's just [drmcguff.com](http://drmcguff.com) and that will link you to YouTube channels, social, and all that sort of stuff, so that's just the easiest way to get to it.

Lawrence Neal: And that's obviously the best way to find out about your consultancy services Doug. And for those listening, [Doug provides consultancy](#) on helping you with [inaudible 00:58:36], answering very specific questions around training clients. How to optimize results for yourself. And I believe you also help corporates as well Doug. Have I missed anything there in terms of what your consultancy service encapsulates?

Dr. Doug McGuff: No that's anything to everything, from virtual workout advice to starting your own HIIT studio. Just last month we went and did, for an IT company up in Charlotte, they set up their own HIIT facility inside their business. Now all 156 of their employees have a scheduled weekly HIIT workout at work. So we do all sorts.

Lawrence Neal: So cool. So I watch Billions, you know the show with Damian Lewis, and I was thinking that's the type of place that would have a state of the art HIIT facility in the office.

Dr. Doug McGuff: Yeah. We can dream.

Lawrence Neal: Sorry, go on.

Dr. Doug McGuff: I said we can dream.

## [HIT Business Membership - Dr Doug McGuff Live Q&A on Myokines](#)

Lawrence Neal: Yeah. And I think everyone here has probably read your books but obviously I highly recommend [Body by Science](#) and the [Body by Science question and answer book](#). Which I think a lot of people forget about that. But that one really answers almost every question that most people have about the nuances of Body by Science. So I highly recommend that. And all of this will be in the thread in the membership for this if you can't remember all these resources. There's a [wonderful article by Simon Shawcross of HITuni about myokines](#).

Dr. Doug McGuff: Yeah, probably one of the best seminars on the whole internet right now. He did a great job.

Lawrence Neal: He did. So if everyone here needs a more simplified layman reference, I will link to that as well. And obviously this is being recorded for future reference inside the membership. So I just want to say thank you so much Doug for doing this. I really appreciate you taking the time. I know you have another appointment so I will let you go. And thank you to everyone listening to this.

Dr. Doug McGuff: Yeah, thanks everyone for checking in.

Lawrence Neal: Awesome. Take care everyone.

Dr. Doug McGuff: All right, thanks.

Lawrence Neal: Bye now.

Dr. Doug McGuff: Bye.