Lawrence Neal: Hi everyone. It's Lawrence here from HIT Business Membership, High Intensity Business. Hope everyone's doing well. So really really excited about this Q&A for December 2019. We've got James Fisher, PhD, who is course leader and senior lecturer in sports conditioning and fitness at the Southampton Solent University in the UK. He is regarded as one of the leading researchers in exercise science and, in particular, resistance training. We do Q&As like this every month. They're typically we do a personal training and a HIT Business Q&A bi-monthly. We alternate over the months in order to bring experts on the Q&A in both of those fields.

Lawrence Neal: In terms of how it will run, if you've got a question please raise a hand via the control panel, or if you're technically challenged like me you can always just type a question and I'm quite happy to read questions out for you, or James may be able to read the questions on the control panel. But what I prefer to do is for people to raise a hand and I'll unmute you and then you can ask a question, James may ask a follow-up to refine it, because we obviously can get into the complexities and nuances of this kind of stuff, and then probably one or two follow-up questions as well is completely fine. That's kind of how we run this and it works really, really well and is very enjoyable for everyone.

Lawrence Neal: This is going to be recorded for future reference, so bear that in mind if you would prefer that what you said isn't recorded, and then don't say it. But do bear in mind that this is a resource that will be in a private community among experts and your colleagues and entrepreneurs in High Intensity Training, which is also one reason I'm really excited about this is because some of the people that are

going to be asking questions are very, very smart people. The members and the membership are all very adept to exercise or business or both.

Lawrence Neal: So that's the intro out of the way. If anyone has a question, please raise your hand. I'm just going to have a look now and see who's ... Okay, so we've got quite a lot of people on the call, so raise your hand and I will unmute you, and you can ask a question. James, are you ready? Have you made your coffee?

James Fisher: I'm good to go.

Lawrence Neal: Good stuff. Thank you for doing this, mate. I really appreciate you taking the time.

James Fisher: Honestly it's my pleasure.

Lawrence Neal: Awesome, okay. So Cass is first to raise her hand so I'm going to unmute Cass, one second. Usually takes a few seconds for it to kick in once I've unmuted someone. So Cass, let us know when you're on the line. Okay so Cass, now I can't hear you yet. Oh no, here you go. I can see your green mic, so I'm assuming you're on now.

Cassandra Av: Okay. So how is this now?

Lawrence Neal: Yeah. I hear you. You're loud and clear. How are you doing?

Cassandra Av: All right. Good morning everybody. I mean for the people who are seeing morning, not for you, Lawrence. But congratulations, Lawrence. You're a father now, Papa Lawrence.

Lawrence Neal: Thank you.

Cassandra Av: Papa Lawrence, Papa Lawrence. Anywho, this is actually I basically wanted to say James, thank you for the recommendations and the papers and the research that you have done in particular, especially for Evan Space Research. What I wanted to ask about in particular is of certain thing that I started noticing, especially in terms of recently not just only myself but clients myself. I also kind of noticed this observation. The idea is that when we kind of do resistance training, is there any increases within the visceral organs to support the working tissues?

Cassandra Av: Maybe that might explain why we see muscular strengths being first before muscle mass because maybe muscle mass, it does require the visceral organs, in particular, the dysplastic bed to be able to support the whole system. Your thoughts?

James Fisher: Okay. Yeah, honestly, that's moving way outside of my room.

Cassandra Av: Okay. All right. Yeah. Because literally, I have seen nobody talk about the fact that we do have a storage system within our physiology. Dysplastic bed actually do contain amino acids that in times of extreme starvation or et cetera, et cetera, sometimes we do preserve skeletal muscle tissue within the dysplastic bed. But nobody talks about this, nobody. I haven't seen anything aside from the research, reading those papers.

James Fisher: Yeah. Yeah. Generally, I have no idea. I think we're really beginning to scratch the surface now of our interaction between our muscular system and our organs. We know that more. I mean it's not so new.

Bentor Pattison back in 2008-ish published the first paper on myokines or published one of the early key papers on myokines, so we know that what the muscular system is is certainly interacting with our organs and with our hormonal system to an extent. But I think we're really just beginning to scratch the surface of what that is, all those interactions, I should say.

James Fisher: So I haven't done any research on that at all. I just simply couldn't comment. The one thing I would say about strength and muscle mass change is Jeremy Lanecky's group have presented a lot. There is less of a connection between strength increases and muscle mass increases than we've previously thought. So I think this is one area where maybe we can tailor our training to specific strength increases or to specific muscle mass increases. I think that the body of research now suggests that the strength increases are more skill-specific than we first thought if it's neural. The muscle mass increases obviously are not as closely linked because they're not neural, they're morphological.

Cassandra Av: Okay. That actually maybe actually makes sense because it actually leads into my other question, which is the needing of particularly running through the anaerobic cycles of our energy systems to build up the excess protons and the inhibition of those calcium ions to be able to contract. I'm really thinking that is it the prevention and the buildup of excess protons on the energy gradient that leads into the reactive oxygen species that leads to muscle hypertrophy versus, say, strength?

James Fisher: Wow. Okay. You're combining everything I learned in my undergraduate physiology to everything that I know about our

growing body of research and I've never really made this connection before. Our understanding of muscle growth is somewhat limited, but certainly I would say that there's a lot of the muscle damage there. Like the environment within the muscle that stimulates muscle growth is certainly a key, key role. This is where I would say I would have to concede that I think volume is a bigger role in muscle growth than we've previously thought. Our calcium ions and our-

Cassandra Av: Yeah. The inhibition of those calcium ions to be able to fire. I ask this because I started understanding that all the interesting things that start happening on health performance, strength, muscle hypertrophy, even endurance training, happens at the mitochondrial cellular level. Assuming we are still because of Dr. Doug McGuff talking about the hormetic effect of exercise as stressor and a stimulus. What if the reactive oxygen species is that necessary hormetic effect to make that appropriate adaptation? That was the big question that I'm thinking. Would this be lessened?

James Fisher: Yeah. I mean I think you're entering a question that to my knowledge the literature doesn't answer completely. We can go back to our calcium ions. What we're kind of talking about here is our difference. It's where muscular failure occurs. There's a lot of hypothesis that is a result of our inability to transfer a signal at the neuromuscular junction which is related to our calcium ions. So I think that reaching muscular failure is stimulating an environment, but it might not be optimizing that environment.

James Fisher: Our [inaudible 00:10:43], which is our chemical species and our oxygen environment and so forth is certainly going to play a key role

in what then happens to stimulate muscle cramps, but I don't think we ought to stimulate muscle protein synthesis, I should say, so I don't think we have made that connection as clearly as we would like to yet.

Cassandra Av: Yeah. I mean I also ask this because given that I started noticing something interesting. When you start stripping away carbohydrates between a diet and performance and if you take away the glucose and glycogen stores, I don't really see the buildup of the excess protons and reactive oxygen species in particularly even endurance training or people they just don't have that, I guess what you would call that second gear to be able to kick in to do that large hormetic effect.

Cassandra Av: I thought maybe that is probably one of the reasons why I think a ketogenic diet it may not be optimal for muscle hypertrophy based on the fact that you can't really tap into that anaerobic cycle as well. I asked that question because of that, but I didn't have any proof yet. So I wanted to ask you if you knew anything about that.

James Fisher: I think that's a pretty logical thought process. I think that we have to go back to bioenergetics to look up anaerobic energy production. So I mean I don't think it's as black and white as saying about low carb or paleo or carb-free diets or anything like that. But it might play a role in the early stages of diet transition. But yeah. I don't know. I mean are you saying that you think that low carb diets can't produce the same muscle growth?

Cassandra Av: Well, the thing is what I notice, even just experimenting with myself is that when I strip myself and I go ultra low carb, like less than 30

grams usable net carbs, and I just had to take an experiment for two weeks. I basically trained my typical high intensity manner and I noticed that I didn't get that certain same really crappy feeling that I usually would if I did, say ... I couldn't handle as much anyways compared to, say, when I did introduce carbohydrates and I back loaded is the thing.

Cassandra Av: Basically I eat my carbs and I try to store up my glycogen stores to tap in. But the training difference is that I felt ... Remember, this is my own case study, my n=1. But it feels like I'm capable of doing more time under load and even just capable of just really, really just destroying myself when I had that carbohydrate. I just used a little bit of dextrose at night because I was lazy. I put it in my protein shake, dextrose, just to experiment and make it relatively simple. It turns out I thought, okay, why is this happening? Why is it that I'm performing a lot more better? It got me back into the whole anaerobic cycle or the anaerobic fermentation.

Cassandra Av: Turns out, yes, some people talk about how the anaerobic cycle is really, really inefficient and it only generates, what, four ATP per molecule. But until I started realizing, no, the anaerobic cycle is really aggressive. It turns in cycles extremely, extremely fast. I think you can, in that four molecule per ATP, it's only you're probably looking at a certain time lapse. But it can actually end up generating up to 120. I thought, okay, that probably explains why I was capable of just generating a massive amount of power output.

James Fisher: Have you found that in the early stages of when you go low carb or consistently?

Cassandra Av: When I consistently go on ultra low carb, I wasn't capable of working at that certain capacity. Even after two weeks and trying to do an induction, it's just that maybe because as time goes by, I wanted to look into how the body metabolizes ketones and it turns out apparently your muscles don't really know how to metabolize ketones. So it's just kind of like the whole ketones being necessary and you can use them for exercise or something seems like a canard, to be honest.

James Fisher: Yeah. Yeah. I mean what you're saying actually echoes my own experience of going very low carb. But I think even though you raised the example that you're n=1, but I think this is where we have to look at this as an individual basis and look at how much variance to a person these kind of diets make. For some people, they might make a great difference and for other people they make no difference. This is where people really need to find their own way. Everybody is, of course, their own n=1. Your examples are really useful for other people who may be experiencing similar things.

Cassandra Av: Yeah. I mean-

Lawrence Neal: Sorry to interrupt. Just-

Cassandra Av: Oh yeah. Take care of everybody else.

Lawrence Neal: I'm sorry. There's quite a few people asking questions. So you're all right for me to mute you for a moment and then just next question?

Cassandra Av: Not a problem.

James Fisher: Cassandra, send me an email.

Cassandra Av: Send you an email? Okay. All right. I'll hit you up, James.

James Fisher: Okay. Cool

Lawrence Neal: Sorry, Cass. I just muted you, but James' email will be in the thread so you'll be able to drop him a line. Okay. So Craig, thank you for being so patient. Cass, great questions. Just one sec. Hi Craig.

Craig Hubert: Can you hear me, Lawrence?

Lawrence Neal: You're very quiet.

Craig Hubert: How about now?

Lawrence Neal: Still very quiet.

Craig Hubert: Now?

Lawrence Neal: Still quiet, Craig. Can you hear that, James?

James Fisher: Yeah. I can hear him.

Craig Hubert: Sorry. My headset crapped out on me, so I've got you on speaker. I don't know if that-

Lawrence Neal: That's better, a lot better.

Craig Hubert: Yeah. I'll try to not move from where I'm standing.

Lawrence Neal: Perfect.

Craig Hubert: How are you, James?

James Fisher: I'm very well, thank you. Craig, how are you?

Craig Hubert: Yeah. I'm good, thank you. Lawrence, congratulations on ...

Lawrence Neal: Thank you.

Craig Hubert: So here's my question. It's more philosophical than it is, I guess, scientific or technical, but based on the research that you've done and Dr. Lanecky's done and the other research on strength training and basically the idea that you just mentioned that it just seems that most of the strength is actually skill-specific. How would you define the goal of exercise? I know Dr. McGuff has mentioned the real objective versus the assumed objective. The Renex guys have sort of touted the same kind of thing. I was curious what your thoughts were on that.

James Fisher: Yeah. That's a really interesting question. Philosophically, I think if you've been doing something because you enjoy doing it-

Lawrence Neal: Sorry, James. I just muted Craig for a moment just because of the interference. But I'll let you resume and then I'll unmute Craig if he wants a follow-up.

James Fisher: Okay. Sure. Thanks.

Lawrence Neal: Continue.

James Fisher: Personally for me, I'm a really big fan of doing things because you enjoy doing them. So as Lawrence and I may have talked about previously, we both like playing basketball. I got into lifting weights as a part of basketball, but I lift weights, I do strength training because I enjoy strength training. If people don't enjoy doing it then there's still obviously massive health benefits to be attained from it, but it's difficult to push upon people to say, "You should be doing this," if they don't enjoy it. It becomes like brushing your teeth,

which I don't think any of us do because we particularly enjoy doing it.

James Fisher: I think though the obvious benefits from the strength training or the benefits that I put on people are obvious things like bone mineral density, strength increases and muscle mass increases, improved flexibility, improved metabolic state, raised metabolic state over a short period. So I probably overtrain in comparison to a lot of other high intensity training people. But I like to think about having a raised metabolic state for a period. So I think there's both acute, there's short-term pleasure, metabolic elements, and then there's a long-term or bone mineral density or strength or so on and so forth.

James Fisher: If we look at it like brushing our teeth, then we want to keep hold of our teeth as long as we can. We know as we age, we lose muscle. So maybe the flip of that is that we want to keep hold of that muscle as long as we can. I don't think it's a bad thing to think of it that way but, of course, if people enjoy it and want to do it more frequently or want to do more of it, then I don't think we should necessarily discourage it as long as they know that they're doing more than maybe they need to. That's my response.

Lawrence Neal: Awesome. I'm just going to unmute Craig, see if you've got any further follow-up questions or thoughts on that.

James Fisher: Hey Craig.

Craig Hubert: Yes. Very good, thanks. Just a quick follow-up then. If you're, let's say, creating a program for somebody and, again, going back on some of the stuff you've done in terms of ... and some of the other

research out there showing that really it's just pitting failure that will create the response. In terms of safety and efficacy for an individual, irrelevant to whether or not they enjoy the training, are you focused more on load? Are you focused more on just time under tension and reaching failure? Is it more [inaudible 00:22:36]?

Lawrence Neal: Craig, you're cutting out there. Just repeat that last 10 seconds.

Craig Hubert: Okay. So basically is inroad the final goal in terms of what you're trying to accomplish with high intensity strength training? So taking a set to failure, is it really irrespective of load or does load matter? Or is it simply based on the individual training? Some people will want to hit that more neurological effect using a heavier weight, lower time under tension versus somebody else who might prefer doing a two or three-minute set to failure.

James Fisher: Yeah. The first thing I was saying, personally, philosophically, I don't think there's a lot to be ... I think we leave a lot on the table if we do a two or three-minute set to failure because I don't know how often we really reach failure after three minutes of exercise. I think we probably cease because of a degree of discomfort caused by the exercise. I would say that there's a lot to be gained by using a relatively heavy load and controlled repetitions through a good range of motion to improve flexibility, to hit upon some of the other benefits we talked about before, such as bone mineral density which right now is really improved primarily through heavy loads or impact.

James Fisher: A lot of the studies looking at bone mineral density have looked at either plyometrics or tennis or things like that or running where

there's obvious impact. I think that we know that there are limitations to that so we don't necessarily want to do it through resistance training. But we know that heavy loads will stimulate improved bone mineral density. So I think if we're looking at optimizing all of the factors, we're probably looking at single sets with a relatively heavy load, probably around the 60-second in the tension mark. I'm personally not a big fan of moving too slow.

James Fisher: I think four to five seconds per muscle action is probably sufficient, going much slower doesn't seem necessary. I personally don't particularly like it unless it's just a very heavy centric. Yeah, so I think as far as the philosophy, I would say that we're looking at probably a shorter time on the tension than some people might think. We're probably looking at maybe a slightly heavier load. I wouldn't go to a very heavy load and be looking at singles purely because I think that that's focusing more so on the neurological system and our synchronous recruitment of muscle fibers as well as the skill acquisition of the exercise itself, especially if it's free weight exercise such as a bench press or a back squat. But I think most people probably listening are using resistance machines.

Lawrence Neal: Thanks, James. Thank you, Craig, for the question. I had to unmute there a second time just so the audio was clear, but let me know if you've got another question and I will open that up for you to ask further on. But now I'm going to unmute Joel. So Joel, thanks for waiting. Just bear me a sec. Okay. Just takes a second here. The joys of GoToWebinar. There you go. Joel, can you hear me? I can see a green mic, but I cannot hear you. Okay. So Joel, if you can't

fix the audio on your side, you might need to type the question. I'm quite happy to ask that on your behalf.

Lawrence Neal: I will, just to save time, I'll mute you for now and then I'll check the questions and perhaps I'll meet you further on. Okay. Bryce, I certainly hope your mic works. Hey Bryce, can you hear me?

Bryce Lee: I can. Can you hear me?

Lawrence Neal: Oh wow. You are loud and clear.

Bryce Lee: Hopefully not too loud.

Lawrence Neal: No. You're perfectly clear. All good.

Bryce Lee: Good morning from the East Coast. Thanks, James and Lawrence, for putting this together.

James Fisher: How you doing, Bryce?

Bryce Lee: I'm great. I had a question that occurs to me all the time, particularly for myself because it's always been a weak point for me is it's very easy for me to push myself to a point where recovery takes maybe 15, 20 minutes. In other words, if I really do a full-body workout there are times where I can be I'm not able to speak intelligently for 20 minutes, I'm breathing so hard. That was always the case with me. I ran cross-country in high school. I'd finish a race, wouldn't do very well. But I'd still be on the ground a lot longer than anybody else.

Bryce Lee: I've always wondered about lactate and buffering and things like that. It seems like there's a threshold over which when I push past

it, it's fine. I don't mind doing it, but I know recovery takes a long time. I wonder about what can be done to mitigate that. I mean obviously you can train less intensely. That's fine. I also notice that, and this is sort of back to what Cass was mentioned earlier, my recovery seems to be a little better if I'm fasted, not necessarily low carb or ketogenic, but if I'm fasted or at least have avoided eating any kind of ... drinking orange juice or anything like that several hours prior.

Bryce Lee: I don't know. I'd love to hear your thoughts about I know lactate is commonly thought of as a waste product when, in fact, it's an energy source and it's taken up by other tissues after the muscles dump it. But I've wondered about is it a pH issue? Should I be supplementing with bicarbonate the way some endurance athletes have done? What do you think about that?

James Fisher: Yeah. That's really interesting. It's funny you say about bicarb. What we're really talking about here is as the muscle forms high volumes of anaerobic work, organic accumulation, in fact, even high volumes of aerobic work will begin to accumulate, build lactate. That's a change in the pH level and it's going to be the demise of energy production to some extent. So what you would encourage for an endurance athlete per se is to do interval training where you build up a buffering, an ability to buffer the lactate that you're accumulating. It's all about what's called our LDH or lactate dehydrogenase.

James Fisher: For example, when it comes to strength training, I'm not sure that anything's been looked at in this realm. But for example, I'm a cyclist so a lot of the time for cycling it's not about doing a lot of

miles on the bike and building up our oxygen uptake. It's about building up our ability to buffer the lactate that we accumulate. So it would be shorter intervals above our lactate threshold. So that's a higher rate above our power for our lactate threshold so that we accumulate that lactate. But we make our body adapt to dealing with it through production of our LDH, our lactate dehydrogenase.

James Fisher: When it comes to resistance training, I don't know. I mean it's interesting that you talk about recovery. Again, people just recover at really different rates. I've known guys that do ... In the labs we do a Wingate test which is a 30-second maximum sprint. One of our criteria for being successful, to be maximal, is within 15 minutes afterwards the participant throws up. That's because of the lactate, the high levels of lactate and the change in where that blood goes to try to buffer that, leaving the stomach and internal organs. But I mean I've seen people do that and not throw up. I've seen people do that and throw up repeatedly and it ruined the rest of their day for hours and hours and hours upon end.

James Fisher: The same people do the same thing with a high intensity workout. There's a name that springs to mind, a colleague of mine who could do a high intensity workout with us but it would literally ruin his day. He could be through it in three exercises and push himself to failure. He could do that in the morning, but at 4:00 or 5 p.m. he ran the risk of throwing up in the passenger seat of his car because he still felt so unwell from the workout. We just have different levels of ability to deal with that workout. I don't know how we train to overcome that. The logic is the more we do it, the more we can adapt to it.

James Fisher: But I guess the more we do it, the more we probably push ourselves and maybe add more volume or add more load or add more stimulus and therefore our body doesn't adapt to it, it just gets tougher. I honestly don't know how we remedy that 20 minutes of, I think Richard Winnett called it carpet time. Yeah. I don't know how we get around that. I think that if you push yourself that far, then you deal with the consequences of it. This is a reason why people go to the high volume approach because they just don't want this. Some people don't experience it. I seldom have a workout that really knocks me for 20 minutes or so, but occasionally.

James Fisher: But I've never put it down to diet or anything like that. I think just our general wellbeing is probably a bigger marker for it. So I don't know.

Bryce Lee: Yeah. If I can follow up, it seems I mean, again, if I mitigate it by training fasted it seems to be better, but I also wonder if there isn't a minimum frequency of really stressing your ability to buffer lactate that you need to be using in order to build and preserve it. So for me, for example, right now I'm on a split where I do an upper body dominant routine one week and a lower body dominant routine the other week. It's enjoyable. It's working great. There's carpet time involved, but I wonder.

Bryce Lee: The leg day is really what gives me some carpet time and I'm wondering if it's just too infrequent to see an improvement in that lactate buffering and if I wouldn't be better off training legs more frequently, which is also kind of what I was hinting at when I messaged you earlier about it seems like some researchers put stuff out suggesting that quads and calves recover much faster than

chest and bis. So is it possible maybe the answer to both of those things is you train legs a little more frequently and then maybe you avoid the carpet time a little better? I don't know. What do you think about that?

James Fisher: Yeah. Again, I think that's really interesting. Again, as a cyclist, I tend to list weights with my legs probably less frequent than my body, myself. That's purely because of the amount of cycling I do, so it's trying to fit it in when I'm not going to ruin everybody else's ride because obviously if you ride in a group, I don't want to kill everybody else's ride because I'm suffering. But yeah, what I do tend to do is I make myself train legs on a reasonable frequency and it's a minimum of once a week just to make sure I don't ever have to go through that discomfort of, okay, I haven't trained legs for three weeks now. I'm still strong in the legs so I'm going to go and do some big dead lifts or leg presses or knee extensions but I'm going to struggle to walk for three days.

James Fisher: There's probably a lot to that. I think the lower body does recover ... I would say evidence supports the lower body does respond differently to upper body as far as muscle growth and the amount of training that it can take. There's evidence to suggest that higher volumes of training are better for the lower body for muscle growth. So I think maybe we find the right training routine for our lower body, whether it's the use of drop sets or it's the use of high interval warm-up sets because the load we're lifting or what that might be. I have no idea. But again, there's definitely something in that.

Lawrence Neal: Awesome. Thanks, James. Bryce, any follow-up?

James Fisher: Sorry if that's not a clear answer. I'm not doing very well at answering people's questions today.

Bryce Lee: We're throwing you a lot of curve balls today, James.

James Fisher: Well, I appreciate it.

Lawrence Neal: All right. Bryce, just going to mute you and move on to ... I'm going to try Joel again. Okay. So Joel, I think it looks like you switched to the phone so hopefully this works. Hey, Joel, can you hear me?

Joel Yakowitz: Hello.

Lawrence Neal: Hey. How are you doing?

Joel Yakowitz: I can hear you. Can you hear me?

Lawrence Neal: Yeah, great.

Joel Yakowitz: I'm here.

Lawrence Neal: I can hear you loud and clear.

Joel Yakowitz: All right. Hey, James, you doing?

James Fisher: I'm very good, Joel. How are you?

Joel Yakowitz: Lawrence, how are you? Sorry.

Lawrence Neal: That's all right. No problem.

Joel Yakowitz: I'll just jump right in here. First of all, just to answer Cass' question on low carb and performance, I was just going to just kind of add in that it's also controlled by the PDH enzyme, which is like the

gatekeeper to glycogen. On a low carb diet, that enzyme basically decreases. I can send some stuff in the group-

Lawrence Neal: That'd be great.

Joel Yakowitz: ... to point to that if anyone's interested. Okay, so my questions here. First of all, obviously we're high intensity strength trainers and so forth. I do not a very slow cadence. I'm about a four/four cadence on my lifts. But I'm wondering is there any evidence that a faster cadence actually does do any harm to joints or has any other negative effects. I can't really seem to find anything on that myself and I'm wondering if that is just a law of high intensity training that really isn't evidence-based.

James Fisher: Joel, I completely agree. You're really throwing us out there now. I don't think there's any evidence to support that faster cadences have a higher injury risk. I think explosive movements might because of the very high immediate forces, but even then I don't think they do necessarily in the lifting of a load. The part of more explosive movements I would always avoid is any catch phase. Of all the athletes I've worked with that have come back to me with injuries from their coaches, from their strength coaches, it's always been in the catch phase of a clean or anything like that or a snatch exercise.

James Fisher: I'm not against more explosive, sorry, faster repetitions, shorter repetition duration, let's just say faster movements. I am against explosive movements purely because seldom do we explode with something and then release it. So for example, if I were so inclined for an athlete to do explosive movement, then I might have them do

a mid-thigh pull or a pull like that, but I would have them release the weight rather than form a catch. But yeah, there's no evidence that I know of to say that faster movements are more dangerous. I definitely think it's something that the HIT community have banded around because there's a degree of logic to it. But it's a bit unfounded.

Joel Yakowitz: Yeah. That makes sense with more kind of dangerous, I guess, things like catch and clean and doing those quick sets, that totally makes sense. Okay. As we age, we don't do things as well. We become less efficient, for example, at converting amino acids into muscle protein synthesis. But there's solutions. We can consume more protein. I'm wondering if there's similar techniques or changes that we can make in regards to strength training to help with muscle growth as we age.

James Fisher: Again, I don't know of anything that's compared different strategies in older adults. We looked at a study a couple of years back looking at low volume, high volume, and we found similar responses in older women. I think the mean age of the study was 78 or something. They were much older women. This was with Paolo Gentile over in Brazil. So I think, again, we just need to look at our population group and say, "What can they do?" I think there's a lot to be said for a minimum dose approach.

James Fisher: Minimum dose will produce the kind of positive effects, but it's not necessarily the optimum dose. So I definitely think with some people, especially with older adults, we don't necessarily want to push them to reach muscular failure where we have a higher risk of things like a Valsalva maneuver and changes in blood pressure. So

we might approach it with a higher volume, that being a higher number of exercises or higher number of sets or a different loading strategy. I think this is where if I'm completely honest, you guys are the practitioners or lots of people on this are probably the practitioners.

James Fisher: They probably take a personal approach, which is exactly what personal training is, take a personal approach to the client to determine what's best for them. Once you start to play with those variables you might be able to increase frequency or you might have to decrease frequency accordingly. There was a study by Tom Polski and Simon Mila was the lead author looking at strength training in older adults and finding within a matter of weeks of training, at a cellular level, they were back to the equivalent of much younger adults. So I think there's good evidence around it.

James Fisher: Most of the studies that have looked at that kind of thing have not taken a high intensity training approach. They're taking a more traditional volume approach of three sets of eight to 10 or three sets or four sets of whatever it might be or even periodized training where they do two or three weeks of six to eight rep max and then two or three weeks of 10 to 12 rep max and so forth. So with that in mind, the research looking at older adults might support or might be deemed to support a higher volume of training. That might be something to look at in the future.

James Fisher: Not many scientists approach resistance training protocols in their studies using a high intensity training approach. The reasoning being, there's a fear that it won't produce any adaptation. I published a study years back with a single set of dead lifts per week

for 12 weeks and people made significant increases. But it got rejected from the first few journals that it was sent to because the reviewer said, "well, you can't get stronger for trained people lifting weights once per week," even though my data showed exactly that it did. That tends to be the approach, that we know what works, you do more and you get more results or you're more likely to get positive results and then we can publish the research. The minimum dose approach is still looked at quite scathingly in an academic sense.

Joel Yakowitz: That's interesting. That's pretty funny that your research basically showed a hypothesis or proved a hypothesis but because of the hypothesis that it proved, they didn't want to publish it?

James Fisher: That's exactly right.

Joel Yakowitz: That's insane.

James Fisher: What I have a tendency to do is I keep some of my old reviews. When I submit a paper and often when it gets rejected, I get such ridiculous comments that I stick them on a pin board just to remind myself of lunacy I'm dealing with in academia. At some point I'm going to publish all of their comments in a big narrative piece saying that actually people have argued this and rejected my papers for this reason and now the body of evidence goes against it and so forth. But I'll do that when I'm old and really bitter.

Joel Yakowitz: That's genius though, I think. I love that. Okay. Let's see, I do have a couple ... Some of these seem to be maybe you kind of answered this already. But the research is showing a lot of benefits to adding

volume. That's kind of what we've just been talking about or hypertrophy. Is there anything that's showing us, I'm assuming not, but where there's a drop-off to doing less volume but at that higher intensity where we're taking it to muscle failure? Are we getting 80% of the benefits or do we just not know?

James Fisher: Yeah. I just don't really think we know. I think that we're hindered by some studies which haven't really done a fair job of going to muscle failure. I know a lot of people aren't going to like to hear this, but I would say that there is probably a benefit to higher volume for building muscle mass, for muscle hypertrophy. I don't think there's anything in strength for higher volume, but I think in muscle mass there might well be. That be in relation to a number of myonuclei. As we do a higher volume we might produce more myonuclei which has a greater potential for growth. But that's a bit hypothetical.

James Fisher: Interestingly, imagine if you built muscle, I think you then maintain it by doing a low volume. I'm not a big fan of periodization. But let me put it this way, I think that we could go through a period of a high volume of training which might in itself stimulate muscle growth and then reduce that volume to kind of stabilize and recoup energy resources and de-stress and allow our body to be back in a state of homeostasis before we then undergo a high volume of stress again with a higher volume of training. I talked with Brad Schoenfeld about the idea of functional overreaching and putting our body through a great stress and then giving it time to recover or to stabilize and then repeating the process.

James Fisher: I think there may be something in that. I think it would be interesting to look at over a longer term with people. It's a difficult study to do

because of the length of time that you would do it for. But I think it's something that people might do as their own n=1 or their own training.

Joel Yakowitz: Yeah. No, that's exciting. Very interesting because that's exactly kind of what I'm starting to try to program for myself using that same concept. So very cool. I think that-

James Fisher: Yeah.

Joel Yakowitz: Sorry. Go ahead.

James Fisher: I was just going to add, for me, I think sometimes that that's not necessarily more volume, but it's more frequency of workouts of every other day for a week and then maybe once a week for the next week or every other day for 10 days and then nearly a four or five-day break. Not that I'm necessarily a prime example for building muscle mass but I'll willing to try different things. At this stage I don't know if there's anything lost by doing it.

Joel Yakowitz: Yeah. Yeah. That was kind of why I had asked that earlier question. That's kind of what I thought. I'm like, "Well, what if I do a week or 10 days or so of doing a little bit quicker cadence so I'm adding some volume in. Maybe I can do two sets instead of just doing the one set to failure and do that a little bit more frequently during that week period and then alternate back and forth. That way maybe I'm kind of ..." I don't know. At least I thought, "Well, at least I'm getting more of marbles into all the bowls."

James Fisher: Yeah. Yeah. I think there's ways that we can approach this. Now and then if I use drop set training, if I do multiple drops then when I

get to a very light load, then sometimes I just think about the idea of just, this sounds really un-academic, but just banging out reps. Just doing as many reps as I can. The form is still pretty good, but I'm just creating as many muscle actions as I can without weight. We're down to a point where the intent of moving the weight is more important than how fast the weight actually moves. So I think there's different approaches to it.

Joel Yakowitz: Totally, yeah. All right. My last question, I don't know if there's an answer for this. But I do have some clients with rheumatoid arthritis. Some of them are musicians so it's in their hands and things from guitar. Some are more elderly clients. Are there any tips for them so that they can continue doing strength training that you know of that might help?

James Fisher: There's nothing that I can think of. That's really not my area of expertise. There's a guy that I work with who might be more okay to answer that, but I'm not in the office right now. If you want to send me an email, then I can certainly see what I can find out. Do you mean in context of in their hands and therefore they struggle with gripping movements?

Joel Yakowitz: Yeah. That's part of it. Sure. But it just seems to be that they have a fear of even starting to lift some weights and stuff because of those pains. I have found that actually using more of a high intensity method does seem to be maybe a possible solution. But yeah, there is some of that stuff, especially with the hands. They don't want to put all of the fatigue of their hands into gripping a bar if it's going to diminish their musicianship, for example, like guitarists.

James Fisher: Yeah. Yeah. If I'm honest, that's not an area that I'm particularly familiar with, so I would really be reluctant to give any recommendations on that. I'm sorry.

Joel Yakowitz: It may be more of a nutrition thing is what I'm thinking.

James Fisher: Right. Maybe, yeah.

Joel Yakowitz: All right. Cool. Thanks so much. Appreciate it.

James Fisher: Okay, Joel. Thanks a lot.

Lawrence Neal: You're welcome, Joel. Thanks for the questions. Okay. We've got a few minutes and, Richard, you've been waiting very patiently so I'm going to unmute you. Spare me a moment. Hey, Richard.

Richard C: Hi. How are you? Can you hear me okay?

Lawrence Neal: Loud and clear. Good. How are you?

Richard C: I'm wonderful. Thank you very much. So some of my questions and thoughts, seems like there's several of us who've had similar things on our minds, type of thing. I just find it interesting when I look at that strength may be more skill-based than originally thought, where a lot of the research we've been measuring increases in strength to determine the effectiveness of various approaches kind of, in the one way, calls a lot of things into question, if you will, because it just kind of makes me wonder if we've been measuring the wrong thing.

Richard C: The other thing, I guess, is where hypertrophy, the Arthur Jones would have been a bigger muscle is a stronger muscle, a stronger muscle's a bigger muscle is one of those things that now it seems

to be called into question depending, of course, on how you define strength and all those things. But anyways, some of these things have already been talked about. I guess the other thing is in some of the Ellington Darden books and whatnot, the role of diet was often downplayed, of course, and the idea of taking excessive protein specifically. In a lot of the Darden books, they're showing the traditional relatively high carb, lower protein that's part of here in Canada, Canada Food Guide or whatnot.

Richard C: I wonder if that's one of the things now when we look at hypertrophy and, of course, the other thing, tangent on a tangent here, is whether hypertrophy is even actually desirable because we look at doing that. I'm doing a greater frequency and stuff like that. But I also wonder the role and having read recently the PE Diet and trying that is to what I have seen with some of my clients here using the lean body tool is that when they getting stronger but not showing much in terms of added muscle. But when they changed their diet and added protein, that seemed to make a fairly significant difference, that enough protein seems to make a difference.

Richard C: I just wondered that sort of calls into question the whole idea that diet based on the old Nautilus mantra was really secondary. You might remember Ellington Darden books talking about you can grow muscle on a starvation diet. But to me, it seems like a proper diet, particularly adequate protein, may be a much bigger factor than originally thought. I guess just to finish long-winded thing here is with a greater frequency and the analogy of building a callus. Somebody just talked about guitar players. When I play guitar every day, I don't overtrain. I build thicker and thicker calluses. I don't

know if that's necessarily better. So is a bigger muscle even more desirable?

Richard C: But certainly the frequency would likely add to that, similar to my calluses on my fingers. But is it even desirable? I just rambled on. Those are just my thoughts. Maybe just James saying if you think I'm off track on some things or challenge some of my thinking.

James Fisher: Richard, thank you. Some really great comments there. Let me try and skip back to the start and see what we can get from this. So when we talk about neurological adaptations and we talk about scale, I think we got to remember we're really talking about the scale of the muscle recruitment of the muscle contraction. So it's not just the scale of an exercise. I don't think we're measuring the wrong things. I think if we measure the exercise that we trained on so, for example, if we do a study where somebody does a back squat for 12 weeks and then at the end of it we test them on a back squat, then we complicate the issue by saying, "Well, they practiced the movement."

James Fisher: In fact, in other languages, resistance training translates to resistance practice, it's identified as practicing an exercise, practicing a skill. Whereas I'm more interested now in people training with one exercise and being tested on another. So for example, my students last year if they were looking at back squat, well, they would test the strength on knee extension or if they were doing a leg press they would test strength on a knee extension to see if there's transfer. Or vice versa, train on a knee extension and test strength on another exercise.

James Fisher: In that what we're looking at really is the skill of our muscle recruitment, so our ability to recruit units of muscle fibers, our ability to send a continuous impulse, so what's called a rate coding, how fast that impulse can actually travel to the muscle to maintain or increase force and so forth. So I don't think we're measuring the wrong things by measuring strength. I still think that they're kind of the key markers. You said about the old Nautilus and El Darden's text about bigger muscle being stronger muscle. I think this is a really interesting area and I like to think of myself as good friends with Jeremy Lanecky.

James Fisher: I think he's an incredibly intelligent guy. We were recently at a conference in Madrid and we spoke a lot about this area, about strength and about the relationship between strength adaptation and muscle size adaptation. The body of research is showing that really maximal strength in the form of a one repetition max or isometric strength doesn't have a good relationship to increases in muscle size. But I posed the question to him as was posed to me by Gary Knight, what about a more submaximal strength measure such as a 10-repetition max rather than a single repetition max?

James Fisher: In a 10-repetition max where we're doing multiple repetitions to failure, we're presumably still increasing the load to a considerable degree, but this time you perform 10 repetitions rather than a single. The skill element of the kind of synchronous recruitment or certainly the adaptation of the exercise is diminished considerably. So I posed the question to Jeremy, what did he think about whether strength adaptations in the form of a 10-rep max, how well that

would align to muscle size adaptation? In fairness, I think that's probably a lot more akin to what we do.

James Fisher: I don't know many people in the high intensity training community who do regular maximal testing days, the one-rep max and so forth. He wasn't so convinced, but I think there's certainly some studies in the pipeline that might look at that. I can't remember if you were at the resistance exercise conference this past March. I think you were, if I recall correctly. But Jeremy talked about muscle size originally being talked of as a noxious adaptation. So yes, in some cases, we maybe don't want to increase muscle mass. If we look at it more logically in the case of many athletes who probably don't want to increase body mass, we want to increase strength and maybe bone mineral density and so forth and get those adaptations but without increasing muscle mass.

James Fisher: So I guess that is going to depend on our client or the individual we're working with. Yeah. I'm trying to think of the transition into you talking about calluses on your fingertips. So I am also a guitar player, although not as often as I'd like. But just about enough to maintain a callus on the fingers of my left hand. But the question I would pose is if I play, I don't know, once a week, once a fortnight, I maintain those calluses and that's sufficient for me. But if I play and the calluses get thicker, then is there any more to be gained by that? Is that an analogy for the volume of training that we need to do or the frequency of training we need to do, that a minimal amount is sufficient to adapt or maintain without doing more unnecessarily?

Richard C: Okay. Your thoughts on my protein tangent?

James Fisher: Apologies, the protein. Yeah. El Darden's a really great guy. I've got a huge amount of time for him. He's been a real idol of mine growing up and reading his texts and we've corresponded previously. I really like what he writes. I disagree with him. I think that protein is key. I think if we look down the body of literature now from the likes of Cameron Mitchell and Rob Morton and Stu Phillips, then we now know that protein is key to muscle protein synthesis and building muscle. Even where resistance training doesn't exist there's an ability to build muscle with higher volumes of protein.

James Fisher: Government guidelines on protein intake are terrible. Most people should be consuming way more protein than they do. Anybody doing resistance training should be consuming probably way more protein than they do. So I think you're absolutely right to be exploring higher protein intakes with your clients. Because of the thermogenic effects of protein as well, I think that we can say that actually going low carb or, sorry, going high carb/low protein is probably not optimal to improve body composition at all and actually we'd be looking at having a calorie deficit with a high protein, lower carbohydrate diet or even a higher protein, lower fat diet if that suited people.

James Fisher: But I think that most people should be looking at, if they're looking to build muscle, should be looking at 1.6-plus grams per kilo of body mass. You can attain that with a calorie deficit and so build muscle and lose fat. There's a study by Stu Phillips' group a few years back which showed exactly that. It wasn't necessarily doing the typical resistance training protocols, but it was certainly doing, I think it was circuit-based resistance exercise. They were on quite an

extreme calorie deficit and still increased their muscle mass on a high protein diet.

Richard C: Okay. Just a final comment, just Jeremy again talking about health span and life span and that strength not necessarily being associated with a longer life span. I have no doubt what his studies probably indicate, but what I struggle with is slips and falls. I wonder in the absence of slips and falls because I know when older people fall, it's often a life-changing event which often they don't recover from in minds of shortening their life span. So I'm just thinking if you can help people avoid slips and falls, seniors, if that in itself to me is going to have a really good chance of lengthening life span.

Richard C: Certainly health span goes without saying. Nobody's debating that we can lengthen health span. But I just think also if you avoid slips and falls, it just seems to me intuitively that life span will be benefiting that.

James Fisher: Yeah. I mean this is where I would tend to agree with you completely and actually disagree with Jeremy. I understand what he's saying and what he's saying is technically accurate. The body of research has shown that stronger people have a lower risk of all-cause mortality. What he's saying is that doesn't show that strength training reduces your risk of all-cause mortality. It just shows that being stronger has a lower risk of all-cause mortality. But I would completely agree with you and I would say that doing strength training where you do all the benefits we've already talked about and, for example, you talked about slips and falls.

James Fisher: In the UK, I think there's something like a 60% rate of if an adult falls and breaks their hip there's a 60% death rate within the next six months or something like that because of how it impacts their life. So yeah, to me, that slip or that fall or that broken hip is what's essentially killed them because it's caused that decline. If we can avoid that by strength training or if we can avoid that break by bone mineral density then, of course, strength training is going to reduce all-cause mortality.

James Fisher: I completely understand what Jeremy's saying. Of course, it's so difficult to prove that something like strength training can reduce risks of dying over the long-term because we need population groups that have never done any type of resistance exercise and populations that have and so forth, then look at the data from there. We're just never going to really get that clear a picture.

Richard C: Thank you very much. I have to sign off early from the call. I'm getting ready for a client. But thank you, Lawrence and James. Congratulations on being a dad. Merry Christmas, everyone.

James Fisher: You too, Richard.

Lawrence Neal: Thank you, Richard.

James Fisher: Thank you so much.

Lawrence Neal: Great questions. We've reached the end point. We're actually over the hour. James, I'm really grateful for you taking the time to answer some extra questions there. Just a couple things before we sign off. James, best way for people to find out more about you and about follow-up if they've got other questions?

James Fisher: Yeah, absolutely. Please send me an email to james.fisher@solent.ac.uk. Hopefully, as I've said, from the questions by Cass at the start, if I don't know the answer then I'll go and look at it and we'll look at some literature and have some intelligent conversations about that. I really like to chat to the practitioners about what you guys are doing and what I might be able to do to help with that. But I may be able to learn from you and vice versa. So yeah, james.fisher@solent.ac.uk. Please send me an email.

Lawrence Neal: Awesome. Thank you for sharing your email, James. Just so everyone knows, this will be recorded and available in the membership if you need to relisten to it. I certainly will be because it got quite deep in the weeds and a lot of it went over my head. So I'm going to be relistening to it myself. It will also be transcribed, so if you prefer to read it or do both, those resources will be available at some point. I just want to say thank you to everyone for being a member and being part of HIT Business membership.

Lawrence Neal: I founded this service in May 2018 and it's been really successful and really popular and I've had great feedback. I'm really excited about it and considering to improve it over time, so some exciting things coming in the future there. Many of you know, so I've got just so everyone's aware ... Sorry, James. Hopefully you don't need to jump off right now. Do you need to go right now or have you got two minutes?

James Fisher: I'm good for now. I'm good for now.

Lawrence Neal: Okay. Just a very quick update for me to everyone. Everyone's already quite aware that I'm opening a studio with a friend, my friend Shawn who actually came to REC this year. We'll be opening in February 2020, so very exciting. I'll actually be sharing a lot of the learnings, a lot of the execution where we take the tactics and strategies from the membership, from the podcast, try them out in our own environment and report back. So I'm really excited to be able to document that and add more value that way to both the membership and the podcast.

Lawrence Neal: But I'll be providing most of the goodies in terms of SAPs, checklists, systems, within the membership only. I have so many podcasts I've already recorded. This is a bit of a mistake I made. I recorded many, many, many podcasts back to back and I actually have four podcasts scheduled, already recorded, which will take me to April of next year, which is a bit unusual because it means you'll hear stuff in April that is recorded a month ago. So I've learned from that and we'll be having a shorter lead time going forward so that it's a little bit more current. Because it feels like I'll be publishing stuff where, for instance, my son, Arthur, would have been around for four or five months by that point.

Lawrence Neal: It will just sound a little bit out of date. So obviously the information is great, but I'll be shortening the lead times on the podcast. So just bear that in mind. But there's some great stuff coming, interviews with people like Matt Hedman and James and Luke did a collaboration together which is a lot of fun and lots, lots more. So that's it. That's the end of the Q&A for December 2019. James, thank you again for taking the time. Really appreciate it. I'm already

feeling the effects of the sleep deprivation that you've been warning me about. So it'll be an interesting next few weeks, I'm sure. I'll probably be hitting you up for advice on Facebook or something like that.

James Fisher: Of course.

Lawrence Neal: But thanks again. Talk to you soon. Thanks, everyone, for tuning in. Look out for all the resources coming in the membership over the next month and for the Q&A in January as well.

James Fisher: Awesome.

Lawrence Neal: All right. That's a wrap. Take care, James. Talk to you all soon. Bye bye.

James Fisher: Thanks a lot, man. Bye bye.