

[HIT Business Membership - Dr Wayne Westcott - How To Assess Muscle Fiber Type And Tailor Workouts For Clients](#)

- Lawrence Neal: 00:01 Dr. Wayne Westcott, welcome back to The Membership, sir.
- Dr. Westcott: 00:05 Thank you, Lawrence. What a privilege to be with you again.
- Lawrence Neal: 00:09 I really appreciate you taking the time, and I am very excited to talk to you about muscle fiber typing. You know, it's something which I have actually talked about on the podcast a little bit in the past, with the likes of [Ryan Hall](#), and I believe probably a few other guests, but been doing the podcast for so many years now that it's easy to forget a lot of the stuff I've spoken about on there. But I'm really keen to dig in to this topic with you, because I think it'd be really useful for myself, and for trainers, to understand how to understand their clients' muscle fiber types, how to assess this, and then, I suppose with that knowledge, be able to then tailor the training to that individual better.
- Lawrence Neal: 00:52 Should we just start off by talking about how do you address the muscle fiber typing in an individual? How do you actually assess what their muscle fiber mix is?
- Dr. Westcott: 01:05 This is a major topic and it's fairly complex but I love the topic and I'll do my best to explain it.

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Dr. Westcott: 01:12 First, muscle fiber types are many and varied. We categorize them into two general classifications. Type I which would normally be called slow-twitch and type II which we would normally call fast-twitch.

Dr. Westcott: 01:29 When you look at an average person, me, and if you took a needle biopsy of my quadriceps muscle which is usually where needle biopsies are done, you'd find about a 50/50 split of fast-twitch and slow-twitch fibers.

Dr. Westcott: 01:46 Fast-twitch, obviously, twitch faster. But the main thing is they fatigue faster. The motor units that contain fast-twitch fibers are a little larger. On average, they have about 500 muscle fibers in that motor unit. You activate, of course, a motor unit not an individual muscle fiber. They allow you to produce more strength, more force, output. But they also fatigue fairly quickly. So, I say that they're fast to fatigue. I'll tell you why I say that in a few minutes.

Dr. Westcott: 02:17 But the others are the slow-twitch. The slow twitch would be about 50% of the average person's quadricep muscle. They fatigue slowly. Yes, they twitch a little slower. A smaller number of fibers. A typical slow-twitch unit, which would

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be about 100 muscle fibers, they don't produce as much force per muscle fiber or more per unit. But they do a good job. They fatigue very slowly. They're involved in endurance activities, always. But they are also, which most people don't understand, they're also involved in every strength activity. When you pick up any weight whether it's 10 pounds, 100 pounds, or 200 pounds, you always engage first the slow-twitch motor units. If there are not enough of the slow-twitch, then, they bring in the varying categories of the fast-twitch units because the muscles don't know how long you're going to do the activity so they always recruit the most enduring fibers first.

Dr. Westcott: 03:17 So, as a 50/50 person, I can do most things fairly well. But I'll never be a great sprinter because the great sprinters have about 85% fast-twitch fibers, in their quadriceps. I'll never be a great marathon runner because the great marathon runners have about 90% slow-twitch fibers in their quadriceps muscles. Both of those characteristics require a specific type of training which, again, we'll get to that.

Dr. Westcott: 03:44 The way to test this, officially, is with needle biopsies which are not very prevalent among

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people, whoever have them because they're quite painful. And there are very few places that do them. We did some research based on a fairly large number of subjects, 150, 141, excuse me, almost 150, who we tested with a certain protocol. This is the protocol. I'm actually getting to answer your first question, I apologize for taking so long.

Lawrence Neal: 04:16 This is excellent. I appreciate the lead up.

Dr. Westcott: 04:18 Okay.

Dr. Westcott: 04:18 So, what we do is we look at the quadriceps, or the pectoralis major, the two dominant muscles in the lower body and the upper body, respectively. Let's say we're doing the quadriceps. We put a person on a leg extension machine, doesn't matter what kind it is, but a leg extension pretty much isolates the quadriceps muscles. In the extension, they're the only muscles that do that so it's a pretty good isolation. We use whatever form you want, we use a pretty [inaudible 00:04:47] form. We use a three second lifting, momentary pause, three second lowering. You do this exercise, a few different sets, with progressive resistance, to eventually find your one repetition maximum.

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Dr. Westcott: 05:03 Your one repetition maximum, let's say it's 100 pounds. We say, okay, we've found your one rep max. We do that in a specific way. We start with an easy weight they can do at least ten times. We rest exactly two minutes to replenish the [inaudible 00:05:20], creates an energy system, almost fully. Then, we go to a weight they can do about five times, doesn't have to be exact, higher weight. Rest two minutes. And we try a two rep max. Then, we go to a one rep max. Or we may just go to the one rep max. Depends on how they do on the five rep max. We rest two minutes. Usually takes us about four to six repetitions. Then, after we get the one rep max, we rest exactly five minutes. Everybody does the same thing. You have to use the exact same technique, whatever technique you use. Doesn't have to be three seconds up, three seconds down.

Dr. Westcott: 05:55 But whatever you use for the testing, you must use now at the end of the five minutes when you place, precisely, 75% of what they did one time. So, if they did 100 for one, we put 75% on the leg extension machine, with the 75 pounds. Now, I do as many repetitions as I can do in the exact same form I was using for my one rep max. In our case, three seconds up, three seconds down.

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- Dr. Westcott: 06:22 If a person does between eight and twelve repetitions, they are pretty much, an even mix. Obviously, if they do fewer, they have more fast-twitch. If they do more, they have more slow-twitch. But they're pretty much an even mix. They do very well in our follow up studies on this. [inaudible 00:06:40] with about eight to twelve repetitions, normally. You can do more or less but normally that's a good repetition range for them.
- Dr. Westcott: 06:48 If they do four to eight repetitions, obviously, there's a little gray area at eight, but if they do four to eight repetitions, then, they are mostly fast-twitch. They fatigue quickly. These are people that usually do a lot more weight. They're usually sprinters and jumpers and throwers. In our research studies, that have a high percentage of fast-twitch fibers, do better training with fewer repetitions. Heavier loads, fewer reps. That matches their muscle physiology because their anaerobic energy system is shorter than the person that does eight to twelve. That's why when we work with, let's say, professional football team players, they don't normally do sets of eight to twelve. They're doing more sets of, maybe sets of six or something like that 'cause

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that matches. They've just figured out, over time, that matches their muscle physiology.

Dr. Westcott: 07:34 On the other extreme, as you already have guessed, if you're doing twelve to sixteen ... We had one person, the winner of the Ironman Triathlon, did 24 perfect repetitions with 75% of mass. Now, most of us can do about ten. She did two and a half times as many as the average person. That's, I guess, what you need to win an Ironman Triathlon. Those people would be slow-twitch. They would want to train with longer duration sets to match their muscle physiology, most appropriately.

Lawrence Neal: 08:05 Great. Okay.

Lawrence Neal: 08:06 A lot of stuff came up for me there in terms of follow up questions. I'm just also thinking in the context of time under load. If we're thinking about it that way. I know a lot of practitioners will use time under load rather than repetitions 'cause sometimes it can be a little bit more accurate way of measuring performance.

Lawrence Neal: 08:27 Eight to twelve reps? So, the protocol you described, which was what? Three up, three down, was it? Was that the protocol that you talked about?

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Dr. Westcott: 08:33 Mm-hmm (affirmative)-

Dr. Westcott: 08:33 Yes.

Lawrence Neal: 08:34 Yeah?

Dr. Westcott: 08:34 Yes.

Lawrence Neal: 08:35 That would be, roughly, around, so, eight reps would be 48 seconds at the bottom end. Then, what's that? 12, 6's, 60. My math is failing me now. But 72 seconds of -

Dr. Westcott: 08:48 ... You're right.

Lawrence Neal: 08:49 So, 48 to 72 is the ... That's interesting 'cause I would, I'm trying to think about my own training and I would, probably, fall within that range. I, probably, have that even mixture.

Lawrence Neal: 09:03 I guess that's also reflective of my body type, right? Because I'm quite, relatively, ectomorphic. Whereas, if I was, perhaps, a bit more towards the mesomorphic body type, would it be more likely that I'd be in that lower rep range or have more fast-twitch? Is that accurate or has that got no relation?

Dr. Westcott: 09:25 No, I would agree with you. I've never [inaudible 00:09:28] research to support that but, empirically, what we see, yes.

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Dr. Westcott: 09:33 I wanted to say, you're so astute. I gave repetitions but when I teach my classes, I never use repetitions. It's just easier for people [inaudible 00:09:44] repetitions. You said yeah, sure. Your followers, definitely, would understand the time under load. Muscles don't count repetitions. They know time to fatigue within the anaerobic energy system. What I should've said, really, is that your fast-twitch people, typically, they're doing four to eight. They're somewhere ... And again, we're doing six second reps ... So, they're somewhere around 25 to 50 seconds is the end of their anaerobic energy system. They fatigue fairly quickly because, as I'll get to later, they're producing so much more power, so much more strength, so much more force output [inaudible 00:10:18] repetitions.

Dr. Westcott: 10:19 The people who can do 12 to 16, we say, "You know, you should be between," and you did your math just fine. We would say, "You might wanna be training more up to 90 seconds per set because you have a longer anaerobic energy system." Say, 70, 65 to 90 seconds or 70 to 90.

Dr. Westcott: 10:39 Those of us in the middle, which would be me, we get great results training between about 50, like I said, the 48, 58 to 70, 48 to 72 seconds.

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That's the best range for us to fatigue our muscles with a heavy enough load that it's still anaerobic. Of course, as you know, there are many that will say it doesn't really matter what weight you use, as long as you go to fatigue. That plays a role, also. But in terms of identifying the best range for people to train that cycle, actually, feels best which is important. Physiologically, it's going to work at least as well, in my opinion, much better in our follow up research, with the athletes with the extremes. It's good to know this information.

Lawrence Neal: 11:23

Yeah.

Lawrence Neal: 11:23

I'm just trying to extrapolate from that, from those ranges. How that, then, would affect what recommendations you might give to a trainee or to a personal training client? 'Cause I don't fully understand that. I'm just thinking you just train to failure. It doesn't really matter. Can you just elaborate on how these discoveries, in terms of placing individuals within these ranges, is actually gonna affect programming?

Dr. Westcott: 11:56

I will. Again, you're exactly right.

Dr. Westcott: 11:59

Most people on the planet are a fairly even mix of fast-twitch and slow-twitch muscle fibers in their

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major groups. Now, we're gonna talk about that in a minute, too.

Dr. Westcott: 12:09 It really doesn't matter. I can train with five reps, ten reps, fifteen reps, twenty reps and I will benefit, probably, equally from all those. I do not have that great potential that some people have who are 80% or more fast-twitch fibers. They will get better results training with fewer reps. The eight to twelve, we feel, will not work as well for them. They'll still work well but these are exceptional athletes. They do train a little differently because they have a different muscular makeup. And a neurological makeup, as well.

Dr. Westcott: 12:44 On the other extreme, your distance performers, the great ones, are going to, you know, eight to twelve reps, they're not gonna reduce their starting strength in eight to twelve reps. We know that. So, to reduce their starting strength ... They're gonna fatigue for other reasons but their starting strength just hangs in there because they're all slow-twitch. And slow-twitch don't typically fatigue in eight to twelve reps. Let's use the time under load, in 30 to 60 seconds. So, they do better when they have a longer duration

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of time under load to kinda match where the end range of their anaerobic energy system might be.

Dr. Westcott: 13:24 May I try and explain it another way?

Lawrence Neal: 13:26 Yeah, go for it. Go for it.

Dr. Westcott: 13:27 Okay, okay.

Dr. Westcott: 13:30 Let's say this, let's say that I do my tests. I do 75% of my maximum ten repetition. When I can no longer do a repetition with 75% of my maximum, it, in essence, means I've reduced my starting strength, my fresh muscle strength by 25%. Or maybe 26%. I can't lift 75%, I've reduced my starting strength by 25%. That was 75% of my maximum. I reduce that by 25%. On average, I'm losing, or using is probably a better term, about 2.5% of my available muscle strength every repetition. On average. In ten reps, I use or lose 2 1/2% of my rep, I've reduced my starting strength by 25%. That's good. That's normal.

Dr. Westcott: 14:24 If you, on the other hand ... I think you're much better, much more [inaudible 00:14:30] than you give yourself credit. I'm gonna call you, at least, a ecto mesomorph, okay? Let's say, just for argument, that you do five reps with 75% of your

maximum. Your max is probably gonna be a lot higher than mine if you're a fast-twitch person. Let's say you do five reps. You've reduced your starting strength by 25% in only five reps. How much of your muscle strength are you using or losing each repetition? Twice as much as me. 5%. That's why you can jump. That's why you can sprint. That's why you're so powerful. That's why you can bench press or power clean or whatever you wanna do, more than me. Because you can recruit a lot of force very quickly and very powerfully. But it doesn't last as long. You can run a great 100 meters but you're not a good [inaudible 00:15:22], let's say.

Dr. Westcott: 15:23

On the other extreme, again, the best person I've ever tested, I tested three different times. Took her a week to recover even though she was a Triathlon champion 'cause she wasn't used to doing this. Three weeks in a row, I tested her. She did 24 perfect reps with 75% of her maximum. That'd be five times as much as you. And 2 1/2 times as much as me. She's probably not gonna, number one, have the build or the physique to do those really heavier weights without breaking down, like 85, 90% of maximum which you'd do 4 or 5 times. Probably too much. Also, she needs

to work her end of the anaerobic energy system which is a lot more than mine. So, she's losing 1% per rep. If you look at the first several reps, if you did this on a computer where you could actually look at the force, her 10th rep is just as strong as her first rep, using an [inaudible 00:16:14] computer. This is amazing.

Dr. Westcott: 16:16 But again, these are the extremes. So, for the average person, it may not be that important. But if you're training, an athlete, it would be well worth the person's while to do that little, simple test. Takes about 15 minutes to do. And say, "Hey, you know, you're really a fast-twitch. Let's just try, most of the time, working a little more specifically to match our exercise protocol to your anaerobic energy system."

Lawrence Neal: 16:42 This reminded me of something. I have a client. She just doesn't seem to be, although she'll tell me she's exhausted, sometimes I'm not sure if she's being completely honest. She doesn't seem, physically, as exhausted even though she's probably hit or got close to muscular failure on her exercises. I'm wondering, is that because maybe she is more of a slow-twitch, she has more of a slow-twitch muscle composition and should, therefore, be doing longer time under

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loads or using loads that enable her to do longer time under load in order to really get at that full muscle fiber spectrum. By doing that, you would see that express itself in terms of her physiology, in terms of heavy breathing, and just being very exhausted. It seems like she's depleting her strength before she can really get at all of her muscle fibers. Is that accurate? Is that -

Dr. Westcott: 17:49 ... I think that's an excellent observation. In general, fast-twitch fibers produce a lot of force. They fatigue fast, quickly, but they recover slowly.

Dr. Westcott: 18:05 Slow-twitch fibers ... Again, we use fibers but you never recruit a fiber, you recruit the motor unit. And again, the whole motor unit is much smaller than the fast-twitch [inaudible 00:18:14] fibers, in general. I hope your listeners understand what I'm saying here. With the slow-twitch units or slow-twitch fibers, they produce a force, they fatigue much more slowly. But they recover from a fatigue [inaudible 00:18:34] much more quickly.

Dr. Westcott: 18:36 So, you could try what you said. You could also try if you didn't wanna do that little test, see if she's more slow-twitch or fast-twitch, see how quickly she recovers between sets, changing, maybe, the recovery. A slow-twitch person

recovers much more quickly than you and I might. They can come back and do a second set with almost as many reps, or at least as many reps, or even more reps. It's like, how can you do that? They have a different muscle physiology than we do. I think your observation is well taken. It might be a good idea just to try that.

Dr. Westcott: 19:09 When we followed up on the studies that we did, that I just shared, how we tested people and found that to be fairly accurate, we took a New England championship track and field team and we trained the sprinters, specifically, we trained the middle distance runners like you and I would train, 8 to 12. We trained the distance runners with higher reps. Interestingly, even though people said the people that do the distance aren't gonna get strong because they're not built for strength which isn't necessarily true. They may not [inaudible 00:19:37] get stronger. [inaudible 00:19:39] neurological component. Also, they said, they're not gonna respond to those high reps. They did. All three groups had almost equal, statistically, certainly, almost equal gains in strength.

Dr. Westcott: 19:51 When you specialize that to people that, these were athletes. People who went on to take

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second place NCAA 10000 meter run and that type of thing. When you specialize like that, I think, it gives you an edge. I think it's a benefit. For me, no. For you, maybe. You're much more athletic than I am. But for the people at the real extremes, absolutely true.

Lawrence Neal: 20:15 Okay. This is really helpful.

Lawrence Neal: 20:19 I'm just, again, trying to understand this. Then, see it in a practical context. If you were training an individual, would you try to look to identify where they might set? I mean, obviously, all likelihood, is that they're gonna fall within the average. I'm sure it's like a bell curve. Would you look to try and identify where they fall or would you just see that, organically, as you train them? You put them on a load, on a relatively high load and see that they fatigue really quickly. Then, you might think, okay, maybe they are far, have far more fast-twitch muscle fiber. How would you go about it if you were training people, when you train people? How do you go about doing that, practically?

Dr. Westcott: 21:04 First, I don't really know what happened with this but the simplest thing ... When you played sports, were you a sprint? Were you a [inaudible

00:21:14]? Were you a distance runner? Were you a football player versus a cyclist or whatever? You get a little clue there. Yeah, I was really good at basketball. I could jump really well. I could dunk when I was ten or something like that. I say you're a fast-twitch person. That's number one.

Dr. Westcott: 21:29 Number two, observation. The people that listen to you are good observers. They understand what's going on. They can observe it. They don't have to do the test. They can figure this out. The test just gives you a little more objective data. That's all. Some people can be fast-twitch at a seven or an eight. Others are fast-twitch at a four, you know. There's a little difference there in how you adjust the training. At least, in my opinion.

Dr. Westcott: 21:54 There's also, not to complicate things, but within our bodies ... I gave the example of the pecs and the quadriceps. You have some muscle groups, all of us do, that are more slow-twitch. Our soleus muscles enable us to stand for hours on end. [inaudible 00:22:11] calf complex. The soleus muscles. They are mostly, in all of us, mostly slow-twitch. They can be up to 80% slow-twitch, normally.

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Dr. Westcott: 22:21 On the other extreme, your triceps muscles, your throwing muscles, striking muscles, golfing muscles, tennis muscles, [inaudible 00:22:29], punching muscles, the triceps, they do such fast movements. They are, typically, up to 80% fast-twitch. I mean, two opposites, here. Triceps and calves. People often say, "I can train calves every day. I've got great calves."

Dr. Westcott: 22:47 I say, "Well, you do have great calves but the reason you can train is because they're slow-twitch. They recover quickly. It doesn't mean that you should. But you could do that."

Dr. Westcott: 22:54 Most people could say, "I can train calves every day 'cause I recover," and they do 'cause they're slow-twitch. I don't know anyone who does triceps every day. If they do, they don't do it very long because triceps don't recover quickly. I make sure ... I'm a cyclist, not a good cyclist but I love to cycle ... I make sure I don't cycle a day or two before my strength training workout because you're on the handlebars, your triceps are contracted. I've just learned over time, they don't recover. I wanna have a good workout so I cycle on days not right before my workout. Triceps fatigue quickly and they recover slowly. [inaudible 00:23:31] within our own bodies. You say,

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"Should I be training twice a week, three days a week," or whatever it might be. Every day. Even in their own body, some muscle groups respond as slow-twitch 'cause they are. Others respond as fast-twitch 'cause they are. The fast-twitch need more recovery days to fully recover.

Lawrence Neal: 23:50

Fascinating. Yeah. Great point to highlight. It is complicated, isn't it? You can say someone's got a more slow-twitch muscle fibers and someone else who has perhaps more fast-twitch. Then, each individual muscle will vary based on a pattern that you see in individuals, like you were saying there about calf muscles. Then, also, there's individual variability, right, as well, just to make it even more complicated.

Lawrence Neal: 24:18

I guess, a good way of addressing this ... I'm also thinking about when I train people is looking at, curious on your forcefulness, looking at their workout card, looking at their performance week to week on the same exercise, and seeing how that's progressing. If it's not going too well, maybe thinking about changing that exercise to every second workout. I know that's oversimplifying things.

Dr. Westcott: 24:46

No. Great.

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Lawrence Neal: 24:46 It's like changing single exercises because you're addressing where maybe they have a different muscle composition for that particular exercise. Is that something you would do?

Dr. Westcott: 25:00 It's not only practical and relevant, it's brilliant. It's exactly ... Looking at progress with people, as simple as that is, we sometimes don't give that enough emphasis. That is so important.

Dr. Westcott: 25:12 By the way, what you just said before that was 100% on target, also, Lawrence. Of all the people we've tested, we've never found one person who was fast-twitch and could not [inaudible 00:25:27] fast-twitch in one realm and slow-twitch in another realm.

Dr. Westcott: 25:31 In other words, if you're a fast-twitch, you're gonna have a higher percentage of fast-twitch throughout your body. Again, you're gonna have some that are slow and some that are fast but they're gonna be more fast-twitch if you're a fast-twitch person, than the average person, proportional. The same way with the slow-twitch.

Dr. Westcott: 25:46 The only person we ever tested that was different ... Another unique individual, he just ... He didn't win it. He completed it. He was a former quadriplegic. He worked his way up so he could

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do an Ironman which is remarkable. [inaudible 00:26:01]. Because of his injury he was more fast-twitch in the upper body, in general, and slow-twitch in the lower body.

Dr. Westcott: 26:07 Usually, as I say, most of the muscle groups are a pretty even split, 50/50, 40/60. I gave you the two kind of outliers. They're the triceps and the soleus muscles.

Dr. Westcott: 26:19 Yes, looking at people's progress and saying, "Hey, if we're not getting results here. Let's not do the same thing we've been doing 'cause we're not getting much. Let's change something."

Dr. Westcott: 26:27 That would be a wise thing to do. Not that you have to do it every day. The recovery time is key. Also, the time under load is key to maximizing those who are really looking for the highest performance improvement.

Lawrence Neal: 26:43 Cool.

Lawrence Neal: 26:44 I'll also take this moment to mention a couple of things. Simon Shawcross over HITuni has done a [great blog post](#) that really complements what we're talking about, regard to optimizing training based on muscle fiber. So, we'll link to that so, if

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people want a blog post with some really good visuals to help complement this, they get a better understanding.

Lawrence Neal: 27:06 Mike Lipowski also did a [YouTube video](#) demonstrating how to find muscle fiber typing. I think he does it in the context of a pec deck. Mike's the founder of [Pure Physique](#), a hit franchise that he's been working on, and gym.

Lawrence Neal: 27:24 Obviously, this'll be transcribed, as well. Just thinking of resources people ... 'Cause I think this takes ... I mean, just for myself, by listening to you, I'm like, I need to go and really think about this. I need to, perhaps, listen back and actually think about this and maybe even write out how this is gonna affect programming because it is quite complicated. I just think those resources would help add color to what we're talking about.

Lawrence Neal: 27:50 So, I'll link to all those and to [inaudible 00:27:51], as well.

Dr. Westcott: 27:53 Thank you. I'm honored to have some good company. Thank you very much for including me.

Lawrence Neal: 27:59 Yeah, no. You're welcome.

Lawrence Neal: 28:01 We talked about a few things there. I've gotta few bullets here in terms of variables to think about.

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I'm not sure ... I don't know what more you can say on this particular thing. If you're looking at, for instance, recovery time. I guess, recovery between workouts and training frequency, is there any research or do you know how muscle fiber typing might play into how we program frequency, for example?

Dr. Westcott: 28:37 It should, by all means, because the slow-twitch fibers can be trained more frequently. They recover fully. The fast-twitch has to be trained less. Again, I hate to keep referring to track and field but I used to coach track and field and observe the athletes. Sprinters don't, as far as we worked with them ... We had some champion sprinters. We had an Olympic silver medalist, actually. They don't sprint every day. When they sprint, they sprint fast but they do a lot of other things in their workouts rather than sprinting as hard as they can because they don't recover in one or two days. In fact, most sprinters feel worse two days after their workout, after a hard workout, than one day after. Very interesting how that happens. I always check with people who strength train. Many people say, "I always feel worse the second day after."

Dr. Westcott: 29:30 I say, "That was a fast-twitch person."

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Dr. Westcott: 29:34 On the other hand, your distance runners, they can run pretty hard. We, typically, filed a hard day, easy day. We had some distance runners. American record holder in the 10000 meter run was on our team. Penn State. At the time, I was just an assistant coach. I was not head coach. Believe me, we had some great coaches there. I was honored to be an assistant coach. That was a person, and the only person on the team, by the way, who could run hard every day because he was very slow-twitch fiber type and would recover very quickly.

Dr. Westcott: 30:08 It would make a difference in those extremes. But most of us ... Let me give you one very important point. McLester and his group did an incredible study a few years ago on recovery time with young, fit males who had been trained. These are trained, young, fit males. He also did young, fit, untrained males. I'll give you the trained 'cause that's your listenership. They did not recover fully in 48 hours. Everybody says, "Oh, 48 hours."

Dr. Westcott: 30:40 They did not recover fully in any muscle group except the calves, for reasons which you mentioned earlier, until 72 hours after their first workout. [inaudible 00:30:51] not only back to

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baseline but a little bit above their baseline. They gained a little bit.

Dr. Westcott: 30:56 Interestingly, they maintained that same level above baseline before they previously were, through 96 hours, through four full days. Sometimes, we may be training even too frequently to maximize our benefits. [inaudible 00:31:15] this or that. There are many other factors. I think that most people could probably train a little less frequently as long as they trained hard and still make, at least, equal if not better benefits. Certainly, that'd be true for the [inaudible 00:31:31]

Lawrence Neal: 31:34 Yeah. Hence, while you train Wednesdays and Saturdays, right?

Dr. Westcott: 31:37 Right. Thank you for remembering. Yeah, I get three days. I get the 72 between Wednesday and Saturday. Interestingly... Again, I'm old so that's a whole different ballgame. Interestingly, I always do better on Wednesday than Saturday when I've had the 96 hours.

Lawrence Neal: 31:54 Yeah. Right.

Dr. Westcott: 31:54 Not a lot better. Whatever I'm trying to get, I always get an extra rep or two on Wednesdays

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compared to Saturdays. Not that that's important. It's a note.

Lawrence Neal: 32:08 Yeah, interesting. Okay.

Lawrence Neal: 32:10 Basically, are you saying that for some people, bringing it back to the muscle fiber side, for those of us who are perhaps more predominately slow-twitch muscle fiber, more marathon type runner type people, they may do better in high frequency training.

Dr. Westcott: 32:31 Higher frequency, yes.

Lawrence Neal: 32:32 Broadly speaking. I know, like you say, it's a mixture of, everyone's got fast and slow. Then, the other chaps, the ones down the other end of the spectrum, who are fast-twitch would perhaps do better with lower frequency. Do you think that maybe twice a week would be as low as you'd wanna go for those people? Would there be exceptions where you would look at maybe once a week? Assuming they're training to muscular failure and all of that.

Dr. Westcott: 33:01 Right. You ask great questions.

Dr. Westcott: 33:04 In our studies with ... Again, these are studies that involve almost 3000 subjects. So, it's a huge stage. One had almost 1200, one had 1700.

What we found was that in average people, beginning participants, one day a week worked. But it was not nearly as good, statistically, as two days a week which was equal to three days a week, in our beginning participants who aren't training as hard as you and I are training.

Dr. Westcott: 33:35 Through and through, not only statistically, they were equal. They both added in terms of amount of muscle. Both added 3.1 pounds of muscle after ten weeks of training. The one day a week group was closer to one pound of muscle. So, one day works but it's not optimal for people who are just doing training.

Dr. Westcott: 33:53 However, having said that, when we look at athletes who are in their sport, they're doing their sport, we have found that one day a week of hard training when they're already doing a sport that requires a lot of muscular strength or muscular power, muscular activity of any nature, one day a week is certainly sufficient for them. They did just as well as two days a week when they're in their ... I'm talking about being in season, competitively a lot going on. They're using a lot of recovery energy for a variety of reasons, plus a lot of emotional energy. One day a week worked very well, at that point.

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Dr. Westcott: 34:28 I didn't answer your question direct because I don't have any reference to answer it directly. Those are just some thoughts. Recovery is not just recovery from strength training. It's recovery from the other things you might be doing.

Dr. Westcott: 34:40 It depends on the season. I'm always stronger in the winter time. I'm not doing my cycling and running as much as I am in the summer. A lot of recovery issues.

Lawrence Neal: 34:50 Yeah, that's an interesting point. For people that wanna dive deeper into that, there's a great bit in Body by Science where, I think, Doug and John Little talk about Blair who was, I wanna say, competitive or amateur ice hockey player, at the time, or [inaudible 00:35:08] skier. He's a [inaudible 00:35:10] of an athlete. So, I can't remember the exact sport. They were looking at what is the optimal training frequency at in season. Obviously, off season, they can train him relatively high frequency but once or twice a week, in high intensity training more than twice a week can cause an over training syndrome. Just training over a high degree of intensity. Off season that was fine. In season, they actually found that he couldn't train at all without losing strength because the season [inaudible 00:35:52]

was so intense in terms of games and training sessions that the overall volume of exercise was too high. He couldn't recover. Really, it was about building as much headroom during the off season as possible so that he would have a lot to go in, knowing he would probably lose a bit of muscle mass during the season.

Lawrence Neal: 36:13

I thought was fascinating 'cause I think so many people who have [inaudible 00:36:17] or aren't really into high intensity training, don't know that's the reality because all they might see is that ... You know, you see athletes on t.v., you see NBA players ... and I say the NBA because I'm always thinking about basketball ... They're doing strength training all the time, alongside all of their games and drills. Albeit, perhaps, not as intense. Those beg the question do they do too much in season which is, probably, the case. And it leads to a lot of these injuries.

Lawrence Neal: 36:47

Anyway, I'm digressing enormously. I just think that people that are interested in learning more about what you said about training in season and the things that affect recovery, [Body by Science](#) is a great resource. I assume everyone's read that who'll listen to this. But that's not always the case. So, it's just a reminder to people.

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- Dr. Westcott: 37:07 Thank you. Very good point.
- Dr. Westcott: 37:11 When we had the privilege of, not training the athletes, but working with the strength coaches with a few of the professional football teams in the United States, some of those teams ... These were high intensity teams. [inaudible 00:37:23]. They would train total body twice a week, as you just said. They trained very hard, obviously.
- Dr. Westcott: 37:30 One of the teams [inaudible 00:37:33] four Super Bowls. They were a very good team. They trained four times a week but they were the only team that I worked with that did. They did a split. They did lower body twice a week, like, say Monday and Thursday. It's the off season. They did upper body twice a week, I forget the days but I think Tuesday and Friday. They split that up. But none of the teams that I worked with ... Again, these are you're ... If you're in the NFL, you're a fast-twitch person. You're very fast-twitch. That's the name of the game. They were not training, even in the off season, more than twice a week.
- Dr. Westcott: 38:08 So, very well taken point, Lawrence. Thank you.
- Lawrence Neal: 38:12 Were they training in the ... What about in season? Surely they couldn't keep that up in season.

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- Dr. Westcott: 38:17 No, no.
- Lawrence Neal: 38:17 Right.
- Dr. Westcott: 38:19 In season, very different. They may even do a lot of their training out on the field and not even in the weight room with manual resistance or things of that nature. Again, each coach was a little different how they approached that. I'm not even remembering exactly how the in season went 'cause I didn't work with them during the actual playing season. But, during the off season, that was how they trained. I'm sure they cut it back even further during the playing season.
- Lawrence Neal: 38:49 Yeah.
- Lawrence Neal: 38:50 One thing I really loved as an idea or strategy is ... Again, going back to the example of Blair and [Body by Science](#), John, again, vague in memory, from what I remember, John Little said they'd try to backward engineer the season. They could see, "Okay, how many games do we have? How much time do we have between games," in order to schedule the training accordingly to almost plan that recovery in advance.
- Lawrence Neal: 39:19 I think that's smart. Those who are listening as trainers, if you're training people who are

competitive athletes or who have other hobbies or sports they do ... Let's say, for instance, they might be ... Competitive athletes are, we kinda talked about that ... Let's say they're a busy professional who's a type A type personality, very driven, ambitious. It's not uncommon for them, also, to have enormous interests in some kind of sport, right? Like, maybe they're training for marathon, Ironman, fill in the blank. I think it's very productive, and love to hear what you think about this, Wayne, to understand that person's really passionate about that. I don't want to make them drop that activity 'cause they get so much enjoyment from it.

Lawrence Neal: 40:07

But let me understand your training schedule for that and also, if it's a sport, what does your season look like in terms of games. Then, use that to backward engineer and schedule their training sessions with you, as a client. I think that's a smart approach to take. Otherwise, you end up, potentially just destroying that client and over training them, stopping them from making progress. You're probably gonna lose them as a client, if that's the case, as well.

Dr. Westcott: 40:38

Brilliant. Brilliantly stated. Absolutely.

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Dr. Westcott: 40:41 The other day, Lawrence, we have a hockey team here called the Boston Bruins, they're doing very well this season. They were doing so well that people were complaining to the coach, saying, "We think you're peaking too soon."

Dr. Westcott: 40:55 The coach, he answered, "So, we try to win every game. If we didn't win any games, you'd be yelling at us for not winning. Maybe we're peaking too soon. We're doing our best to win every game."

Dr. Westcott: 41:09 That's a pretty good answer. I thought that's a great answer, coach.

Dr. Westcott: 41:12 What does happen, based on what you were telling us in the Body by Science, which is true, you end up being stronger in the beginning of the season. But in the play-offs, when you really need to be at your greatest strength ... I suppose the other team's in the same boat so it equals out ... It just doesn't make sense. Just the changing rules, the helmets, and things like that, some of our colleagues are doing research on that for the NFL which is wonderful. They may wanna look at, especially basketball, the scheduling. Hockey 'cause they're so intense. Football, a little different sport. We need to

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protect our athletes a little bit so they don't go into all that pressure in the finals when the strength is down.

Dr. Westcott: 41:58 I didn't answer your question but I just thought I'd throw that in there.

Lawrence Neal: 42:00 No, no. It wasn't really a question. It more just I was interested in your thoughts about what I said. No, that was great. You just complemented that.

Lawrence Neal: 42:10 But, yeah, you just made me realize all these sports have playoffs, have finals and that's the most important part. That's when the athlete needs to be at their absolute best. If they're doing tons of strength training in season and all of the enormous number of games that some of these athletes play and training on top of that, it's like they're going into the playoffs just asking for injuries, you know? It's just crazy. It's nuts. Bonkers.

Dr. Westcott: 42:40 Not to mention Boston, again, but we've had a fair success with our football team, the New England Patriots, they won the Super Bowl again this year. They've won quite a few. They win, typically, when they get a bye week because they don't have to play the first of the playoffs cause

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they already ... That got that bye week built in there. [inaudible 00:43:01]

Dr. Westcott: 43:00 That's true for most, not all, but most of the Super Bowl champions. They haven't played in as many playoff games as the ones that get eliminated. They've had that bye week in there because of how they placed. They won their division so they didn't have to play that first week.

Dr. Westcott: 43:17 The rest is so important. We don't address that enough. We talk about training but the recovery and the rest is extremely important. I think that does play into some of the things we're talking about with training, specifically, and appropriate rest intervals.

Lawrence Neal: 43:36 Yeah. Excellent.

Dr. Westcott: 43:38 Frequent.

Lawrence Neal: 43:39 Yeah.

Lawrence Neal: 43:40 Wayne, it's been so much fun, as always. I really appreciate you taking the time. I appreciate you bringing the NFL examples to the table because I know nothing about the NFL. I find it very interesting but being a Brit, I don't really follow, obviously. I only follow NBA because I've played

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basketball since I was a youngster. It's good that you're bringing up the NFL. I bring up the NBA. It gives people a more diversity.

Lawrence Neal: 44:09

What's the best way for people to find out more about you and get in touch with you?

Dr. Westcott: 44:17

I am not very good at that. I don't have a presence on the Internet, at all. You are probably my best resource. I'm a quiet, shy type of person. I don't have a presence there.

Dr. Westcott: 44:34

I always, as I hope you know, answer my emails and my phone calls. I try to be a resource for people, if I can. I'm an old-timer and I go way back, the Arthur Jones era with Arthur. Most of what I speak about was initiated by Arthur Jones who was a brilliant, brilliant man. I think that's probably true for many of the people in the high intensity training. We owe him a debt of gratitude, in that regard.

Dr. Westcott: 44:59

I would just simply say that my role in this has been to take things to people like you and other creative people who say, "Hey, you should try this or that."

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- Dr. Westcott: 45:07 I just do a research thing and say, "Hey, you're right," or, "You're sorta right," or "Hey, you're not right."
- Dr. Westcott: 45:13 That's my role. I'm not very creative but I can take something and put it into a study and say, "Yeah, but the research backs up what you're saying."
- Dr. Westcott: 45:22 One reason I like interviewing with you is 'cause you are so creative, you're thoughtful, you ask great questions, and, usually, our research is 100% in concert with what you're saying. So, we appreciate that.
- Lawrence Neal: 45:32 Yeah, that's fortunate.
- Lawrence Neal: 45:36 Remind me, Wayne, did you know Arthur personally? Did you have many experiences with him?
- Dr. Westcott: 45:41 Yes, I sure do.
- Dr. Westcott: 45:42 I almost [inaudible 00:45:44] Ellington Darden. Arthur, I questioned him once about his speed of training, his slow speed, and he said, this is true, he said, "Let's go feed Gomec," Gomec was his 17 1/2 foot, man eating crocodile that he kept in a fairly small cage. I said, "Oh, great. I'd love to see them feed Gomec."

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- Dr. Westcott: 46:03 He answered the door and he said, "Go in," he opens the big iron gates. He says, "Go in."
- Dr. Westcott: 46:10 I said, "In? This is a man eating crocodile. It's three times my size."
- Dr. Westcott: 46:16 He went in with me. This is Arthur. I didn't know Arthur. You had to know Arthur. Everyone who knows him'll tell you, I'm not making this up. He walks over with his black shoes, his black, round tipped shoes. He kicks the crocodile, Gomec, man eating crocodile from the Fly River in Papua New Guinea, 17 1/2 foot long, the largest crocodile ever in captivity. He kicks him under the jaw. The crocodiles open up their top jaw. There's a hole at the bottom. Opens up his top jaw which is about 4 1/2 feet. All I'm looking at these teeth of a crocodile, about ten feet in front of me. I'm thinking, "This is not how I wanted to spend my last few minutes on planet Earth."
- Dr. Westcott: 46:57 Arthur'd been in there before. He's a character. He had a whole pail, about 70 pounds [inaudible 00:47:02]. It's cooked. That's what the crocodile liked. He threw that pail of food in his mouth. The croc swallowed it in one fell swoop, just one swallow. Arthur, as I'm backed up against the

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fence, trying to think what I'm gonna say for my last word, he said, "Okay, we fed him. Let's go."

- Dr. Westcott: 47:24 That was Arthur Jones. You never disagreed with Arthur. You knew that if you did disagree, he would shoot you and then feed you to the crocodile. I thought I better just go in willingly. He was a character. I could tell you stories all day about him and I only knew him half as well as most of the other people. He was a brilliant man. I think we all owe him a debt of gratitude for what he brought to the table.
- Lawrence Neal: 47:49 For sure. That's hilarious. Thank you for sharing that.
- Lawrence Neal: 47:53 I don't think we've spoken about him much in the past. But I'd love to do a podcast in the future together where you just share all of your funny stories and inspirational stories with Arthur. That would be a lot of fun, for sure.
- Dr. Westcott: 48:08 I'll share one last thing.
- Dr. Westcott: 48:10 What I remember him saying to me most, every time we were together, he would always tell me something and then he would look at me, he would look and he would grimace and he would say ... And he, also, had a cigarette in his mouth.

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I'll try to say it like he did but my mouth goes ...  
"I'll explain it again so that even you can understand it."

Dr. Westcott: 48:29

He would always say that to me.

Dr. Westcott: 48:31

I was, "Thank you, Arthur. I appreciate that."

Dr. Westcott: 48:34

He was a character.

Lawrence Neal: 48:34

Yeah.

Lawrence Neal: 48:36

For those, again, I think 99% of our listeners are gonna know who Arthur Jones is but I forget, I live in a bubble sometimes, and I do have to kind of think about people are just coming to this stuff for the first time. You'll hear Arthur Jones' name come up all the time in my work and in my content. He was just an absolute genius. The inventor of Nautilus and MedX. Pretty much the inspiration of every exercise machine you see today even though they didn't necessarily follow his advice. The more commercial machines that don't have very good resistance and strength [inaudible 00:49:13] and things like that. He was enormous influence. Just a brilliant, very intelligent man but also incredibly eccentric, as Wayne has elaborated on. Very entrepreneurial and just mad as a bag of cats was what we

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would probably say in Ireland. Very interesting individual. Someone to learn more about is a very enjoyable journey, indeed.

Lawrence Neal: 49:41 Wayne, I will wrap it up there. But thanks again. Thank you so much for joining me. Really appreciate you taking the time.

Dr. Westcott: 49:49 Always a privilege. I learn far more from you than you learn from me.

Dr. Westcott: 49:52 Thank you very much, Lawrence.

Lawrence Neal: 49:54 I highly doubt that, Wayne.

Lawrence Neal: 49:57 All right. Take care.

Dr. Westcott: 49:59 Bye now.