

Flex Diet Podcast Jeff Rothschild

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SPEAKERS

Michael Nelson



Michael Nelson 00:00

Hey, what's going on? It's Dr. Mike T. Nelson here with another episode of the flex diet podcast. And today I've got my good buddy Jeff Ross child on the program. And we are going to be talking about his latest study that was just published. Not in fuzzy rats, but an actual training humans about fed versus fasted cardio and training. Does protein change what fuels you're using fats or carbohydrates? Those eating beforehand make a difference. Should you be doing it fast that he did a really cool study, and we got him on the phone all the way over in Kiwi land in New Zealand there. So I'm super excited to get this information out to you. I've known Jeff for many years, and it's always great to chat with him. This is brought to you by the flex diet certification, go to flexdiet.com fxdt.com you'll be able to get on the waitlist. For the next time that the flex diet cert opens up. That'll also put you on the daily newsletter with all sorts of great stuff free into your inbox. So go to flexdiet.com and enjoy my chat today with Jeff Ross child. Hey, what's going on? It's Dr. Mike T. Nelson here with the flex diet podcast again, with my good buddy Jeff Ross child who is checking in all the way from Kiwi land. He's in New Zealand right now. So this is why we opted not to do video on this because Skype may hate us. And I'm sure people write in about this probably better software than Skype. But anyway. Yeah. Welcome to the podcast. Jeff, thank you for being on.



02:02

Thanks. I'm happy to be here. Always nice to chat with you.



Michael Nelson 02:04

Yeah, you've published some super cool research that will I get to come in, coming up. And I thought, well, I'll just get you on the podcast I think we had was the first time we met. I think it was out in California. You know, the first time we met was at



02:21

the ancestral HS in Ohio. That's right. in Berkeley,



Michael Nelson 02:26

Berkeley. That's right. Good memory.



02:28

Oh, gosh, I don't know what year that was. But that was a while ago. Is



02:32

that six years ago now? Probably longer than that.



02:35

At least Yeah,



Michael Nelson 02:36

no, that's right. Good times. So for people who are not familiar, give your little spiel on your background, and then how you ended up in New Zealand? Sure, yeah.



02:47

I'm a registered dietitian. I've did I did. I've lived in Los Angeles for about the last 20 years, until about a year and a half ago, where I came to New Zealand to do my PhD looking at basically how what we eat for exercise, like pre exercise nutrition, and how that affects our exercise session acutely and also longer term training adaptations. So obviously, we care about what happens during the workout we're doing right now. But more importantly, for

most people is what happens over time, you know, what, what kind of what should I eat, to help me get the best adaptations from my workout over time?



Michael Nelson 03:21

Awesome. And tell us a little bit more about because you've worked with a whole wide variety of athletes, if I remember right, from Yeah, tennis players to again, across the board.



03:34

short version. So yeah, I spent about the last five or six years before coming here, working in a private practice setting in Los Angeles as a dietitian, so working individually, individually with people, a lot of endurance athletes, to triathletes and cyclists, but also, like you said, professional eSports athletes, so professional gamers, also, I have worked with a lot of tennis players. And so yeah, it was something I was kind of continuing to do stay involved in research a bit while I was doing that, but just kind of peripherally. And obviously it was something I was interested in. So it was really felt like just kind of appropriate next step for me to come and do a PhD and obviously there was a lot of different places in the world that are that are excellent that this this lab this program is just a really good fit for me where we focus on applied research so certainly nothing wrong with doing you know, a lot of kind of test tube research that gives important information and then just you know, kind of field research but what really I'm focused on and this group here is kind of like lab lab based but applied research so really kind of tangible things that that people can hopefully put into



Michael Nelson 04:36

action and give a plug for the university and the exact program you're in.



04:42

So thanks for coaching me along here. Yeah,



04:45

I know this stuff, but people listening are like what?



04:48

Right right so yeah, I am at Auckland University of Technology so that the specific lab is called the sports performance Research Institute in New Zealand or sprints. That's a it's kind of an acronym or name you might see around this. A lot. have excellent research that's come out of here over the past, you know, 10 plus years. And so I'm really just thrilled to be a part of it.



Michael Nelson 05:06

I assume you've met Dr. Eric Helms who's been on this podcast here before.



05:11

Yep, front of the podcast. Yeah, I see him around quite a bit. He's kind of got that the more strength side of the lab, and we have another group that's a little more endurance focused.



Michael Nelson 05:21

Awesome. What was the main reason you decided to go all the way over to New Zealand because you have a family? So you moved over there? You're one of those crazy people like I am the did your PhD later in life, which presents its own host of challenges. Yeah, yeah.



05:41

I think it was. Well, I wanted the combination of a good fit. Like I said, it's something that applied research on a topic that was really of interest to me. And I wanted a good place to live. This is certainly one of those things. And, yeah, those are the two big things I wanted, a place that I had certainly been following this lab, I followed their research for a number of years, and to see quality work coming out over and over again. And the supervisors that I work with Dan plews, as my primary supervisor, and nice and Andy gilding, they just have both done so much great research and have so much great experience. So just seemed like a really good fit. And yeah, it was far away. But you know, guess it's not that far. It seems far. But it's I mean, plane ride is a long plane ride. It's not that different from going across the US. It just takes an extra, you know, half a day, basically. Yeah.

M

Michael Nelson 06:31

Yeah. This I'm teaching him was down in Australia last year. And that's a hell of a plane ride. Yeah. Yeah. And I think for the listeners, it's pretty rare that programs are dedicated to applied research, they're becoming a little bit more popular now, which I think is great. But most research, even the lab that I was in the arguments or discussions I'd have with my advisor all the time was, you know, why are you so interested in performance metrics? And I'm like, why are you not interested in performance metrics? And I asked him Monday, I said, Well, I said, I said, I'm so confused, because you don't seem to care too much about performance. But why did you end up in the exercise physiology program, obviously, you know, he's very successful been doing it for a long time. And he's like, well, I just use exercises a variable to like push stuff around to figure out physiology. I'm like, Oh, interesting. Okay, that makes sense. Because physiology at rest is pretty damn boring. You know, then movement and stress is a lot more interesting and gives us clues as to what's going on. But yeah, just befuddled me that like, even though everyone else in the lab, like nobody gave to rats asks about anything performance related, which I thought was just odd. And so I'm trying to, you know, ad hoc, these studies that are a little bit more performance based within the realms of trying to graduate and what you have for equipment, and all that kind of stuff. So it's super cool to see that there's programs that are actually, you know, dedicated to obviously, the academic rigor and making sure you understand the research, but, you know, trying to do things that are, you know, very much in the applied realm.



08:18

Exactly, yeah.

M

Michael Nelson 08:20

Yeah. The other lab that I think of is where Dr. Andy Galpin is add to, and I think it was Dr. Brown, who did a lot of they both have done a lot of Applied Research, too, which is Yeah,



08:30

exactly. Yeah.

M

Michael Nelson 08:33

Cool. So tell us more. I know, you just had a paper that was just published a couple of weeks ago. So tell us all about it.



08:40

Yeah, yeah, actually, I think is less than about a week ago or so. This was, this is a study from my PhD. So just for those that don't know, typically a PhD is is well, in my context is a is a kind of a handful of studies that all kind of look at a similar question just from a different viewpoint. So the first part of my PhD, which we can you can also talk about was, we did a survey, basically wanting to figure out what people actually eat before exercise what endurance athletes eat. So we did a survey of around 2000 endurance athletes from all around the world and figured out you know, how many people do fasted training? Do people eat carbs before breakfast or bristling before exercise or protein? or Why do people fast if they do it or you know, all the all these things surrounding the kind of the habits and the beliefs around, you know, what people eat before exercise? So that was certainly very interesting. And one of the things a couple of things that really stood out is one, about two thirds of endurance athletes perform some type of fasted training meaning at least at least once or twice a week, or sometimes they do that more. And the the big reasons people do that are to increase fat burning, and to reduce their gut discomfort or you know, improve gut comfort during exercise. And also people think it's going to improve their performance or get a you know, get a better workout. At the same time. What's interesting is a lot of people Avoid faster training because they think it will be harmful or won't help their workout. And or they think, no, they think that might be too hungry. Or they just think that you know, it's not, it's just not worth doing. And so it's certainly possible that this, these both can be true. But it's, it's, it's interesting how, in many ways people feel so strongly that it's either a good thing with faster training, for example, or it's a bad thing. And so there's really just a lot of, I guess, confusion, different opinions and the research, it's not as clear, as you know, a lot of people either make out or make it out to be or people think it is. So then that was, you know, the kind of the first step of my PhD, then we did this, we consider an acute crossover study. So that was, we had a group of cyclists, we had pretty well trained cyclists. And they did a workout on three occasions once in the fasted state, once after a carbohydrate rich breakfast, and once following a protein rich breakfast. So just to give you a sense of what that would look like is the carb breakfast would be like a bottle, a sports drink, and a slice of bread and jam. And then the protein breakfast would be was the same number of calories, but it was essentially a scoop of whey protein, and a couple of scoops of peanut butter. And so you get the same amount of calories. But you know, the differences, obviously, the carbohydrates, and then we had people exercise at for 20 minutes at kind of a low to moderate intensity. And that allowed us to measure things like how much fat and carbohydrate they're burning, how, how hard if the workout felt, the heart rate, things like that. And then we had them do an interval workout, which was six by three minute intervals. And then of those six, we had the first three at a certain wattage, certain intensity, that would be considered kind of hard, but doable. And then we had three, the last three intervals, the last three, three minute

intervals were full on as much, you know, watts people could muster. And that allows us to see, you know, if there's any performance element of like, How good can you perform interval training, if you're in these after these different breakfasts.



11:55

And this was on a bike, correct?



11:57

Yeah. So yeah, so it's like, Listen, this was all a cycling workout. So I guess I'll jump to the punch line. I think, you know, as far as fat burning during exercise, it's, it's definitely been well established that if you're in the fasted state, you'll burn more fat during submaximal exercise. So meaning, you know, you're going to kind of continue continuous exercise at a medium intensity, it's it's no surprise that you'll burn more fat when you're fasted compared with if you've just had a carbohydrate rich breakfast. So, of course, we saw that. But kind of a newer thing is there's been a few studies, but but not nearly as many is what happens if you have protein. So protein a lot of your listeners might know will cause an insulin response. So most people might think, Oh, it's going to shut off fat burning. But it's not really the case, when you have pre exercise protein doesn't seem to be not not just in other studies have found this. And we're adding to this now that when you have protein, your fat burning during exercises, not exactly the same as if you're fasted, but but pretty close. So you're still able to eat a full breakfast, and burn a whole lot of fat during your your workout. And we'll come back and talk about the ramifications. I guess. You want to just walk through kind of the key findings. Now we can kind of dive



13:08

Yeah, perfect people.



13:10

Yeah, so we found it during that submaximal exercise protein allowed, again, not not exactly as high but almost as high fat burning as fasted state. So that's pretty interesting. And then, in terms of performance, there was no differences in how like well, or how much watts peak watts people could put out during the interval workout. So that was surprising, a lot of people would assume that carbs would give you the best performance. But that's not the case. And a couple thoughts on why that is, again, we'll come back to that. Then

the other things we looked at were hunger and gut comfort. Interestingly, there was no difference in hunger between those treatments either. So we asked people first, when they first came in, before they ate anything, how hungry they were. And you quantify this use a totally visual analog scale. So it's like a piece of paper with a 10 centimeters long. And at the at one end is like no hunger, not hungry at all. And then on the other end is extremely hungry. And they draw a line where that is and then you measure it. And that's a way to quantify the hunger. And we did that, again when people first came in. So they were all in the fasted state. And then at the end of exercise, and everyone's hunger went down. But there was no differences between the groups, and then got got discomfort. That was pretty low throughout, although it was slightly higher when people had protein. So some people that had the protein and then exercised, you know, their got comfort was a little bit worse. Nothing was like terrible. But there was a slight difference there. So yeah, so basically, to just kind of summarize that again, you will burn the most fat when you're fasted, that's, that's again, not not too controversial. But you can also have a protein shake beforehand and still burn roughly the same amount of fat and your performance doesn't for performance. It doesn't really matter what you had beforehand. And a big key for the context, though, is His workout was about an hour in duration. So it was 20 minutes of submaximal cycling, and then six by three minutes intervals. So it's kind of like a typical one hour workout that someone might do on a weekday before work or something like that. Definitely, this would be a different story if we're talking about a three hour workout or something like that. But again, for this context of kind of someone's typical weekday workout that might be around an hour or so doesn't really matter from a performance standpoint. And again, hunger standpoint, hunger is gonna go down, probably because of the lactate you created during the exercise during the high intensity intervals. And so, yeah, that's that's kind of the overview. You have any thoughts? You want to jump in?

M

Michael Nelson 15:35

Yeah. On the the lactaid drop in hunger, how long after, did you measure hunger? Because what I've seen with some clients is after high intensity interval training, if you go immediately after, I find pretty much, no one's really hungry, they're just kind of like, That was horrible. And in the labs, we used to just, you know, punish people with Wingate testing, and we'd have, the TA is which I was one of them, we'd have a little unofficial, we'll say betting pool, but unofficial, of how many people would puke afterwards. And usually a couple, especially the the Friday ad from some of the fraternity guys who maybe enjoy it a little bit too much the night before. But what I've seen in clients is that if you go a couple hours after and that kind of subsides, sometimes I have are just like that, I'm not really that hungry at all. And some clients are just like, really hungry, compared to, again, it's anecdotal, but steady state. Yeah, I don't seem to see that kind of bipolar effect. Have you seen something similar? Yeah, I



16:41

mean, that that sounds like about what I might expect, I think, certainly, so lactate, that the stuff you create during that those kind of hard efforts, that will lower appetite. So that's probably why we asked people right after exercise. And so I don't doubt that if we had asked, like, if we didn't let people eat for another two hours, there would be, you know, probably a difference there. But again, thinking about the practical application, you're going to do your workout, and so no one's hungry at the end of it. And then, you know, you might clean up and then you probably, you know, they would have gotten hungry and, and eaten. And so, you know, the key from my perspective was during the workout, and at the end of the workout, you're, you know, hunger wasn't an issue, even when people were fasted. So even if someone was hungry before, that that's going to go away during that workout. And then if you get hungry afterwards, you know, then that's good. And you can you need something. So just to kind of again, from that almost a bit of pushback from people that say, I don't want to pass the training because I get too hungry. Now you're right. If it's low intensity work, exercise, there might be a difference. And also, to your point about people not being hungry for a while after that. I think that's probably to do with someone's gut health. Exercise. It's like gut permeability occurs. If someone with a really good gut, that's a strong barrier, probably would get hungry quicker. But but that kind of Yeah, like that exercise induced gut permeability probably lingers a bit longer in people with with poor gut health.

M

Michael Nelson 18:03

Yeah, and there's also kind of matches what I've just do the last questions all the time. And it's a good question of, you know, should I consume anything during training. And you can obviously look up those different recommendations from different groups. And there's a fair amount of research on this. And, to me, this seems to match, you know, kind of what I've seen, and what I've just kind of recommended that if you're doing like 60 minutes of exercise, and again, this is a broad brush, I don't get too worried about if you're consuming anything during or anything special, unless you're really trying to maximize, you know, performance. If I have people that I'm really trying to get more calories in them or their stress is higher, I find that it can help to have some carbohydrates. But if it's just the general population, I think 60 minutes or less, you're probably fine without necessarily having anything special in terms of fueling. And this would kind of support that also. Yeah, and I'll



19:00

I'll add in the electrolytes question comes up a lot. I mean, my response almost always is if

if the workout is short enough that you don't need carbohydrates. So let's say about 90 minutes is probably a good cutoff, where below that you're not going to need any calories in your drink, then you certainly aren't going to need any electrolytes either. And if it's long enough that we probably started in calories, then you're going to, you know, the electrolytes are going to come with us this carbohydrates anyway. So I just can't really see any need for something like a noon tablet, if you'd like to taste I mean, I don't think it's harmful. But, you know, for someone to think, you know, they're doing a Soul Cycle or something, or even an interval workout or whatever. I just don't, I just can't see why you would need that. But you hit on something that that I think is really one of the biggest and most important points of this paper. You know, a lot of people that are they're burning a lot of calories. Let's say someone who's very fit, they're gonna burn more calories per hour. Someone who's doing a high training volume. If they do fasted training, they're already I mean, you already wake up essentially in a calorie hole from home. If you haven't eaten for, you know, eight to 12 hours or whatever you do, you burn another 1000 calories during exercise, that's a really big hole you've dug in. And then most people don't eat enough post workout, you know, when they're going to go to work, they might have something and then then they might have kind of a medium lunch, then it kind of all gets made up for after dinner, or dinner, and you know, the afternoon and dinner and so on. Having, you know, I should say, knowing that you can have some protein and peanut butter and you know, some calories before your workout. Now sacrifice any of that kind of, quote unquote, benefits in terms of fat burning during your workout. I think that's really important for people, again, with a high training volume, burning a lot of calories, or who need those extra calories. But maybe don't want the carbohydrates. I don't think carbohydrates before a problem either. But if someone doesn't want them, this, this protein option gives you, you know, it is really an underutilized option to avoid getting in such a big calorie deficit.

M

Michael Nelson 20:50

Yeah, especially if people trying to get more protein. And I've just noticed that. And I'm a fan of intermittent fasting depending on how it's done. But I'm not as big a fan of longer fasting windows every day. For some people, if they're really trying to lose weight, and they're not, I would say higher level fitness, I think it's probably fine. I've had a few higher level fitness people do like a 16, eight, and they've been okay. But in general, I agree with you that if you have this long fasted window, you're probably going to be quite short on calories. And again, if that's your plan, and you're trying to do body comp, it might be okay. But as you said, I get worried because I always monitor what is their evening meal. And if they start going like crazy in the evening, I'm like, well, let's just go to a more moderate approach and not try to cram everything into a six hour eating window. And you feel like you Yeah, I think for three hours before bed. That's right. And



21:52

I think another one of the most under appreciated kind of concepts is this within day energy balance. Yeah. And you know, it's the people that aren't familiar, it's kind of, if you imagine, like a zero is like, exactly, you're matching the calories in calories out every minute of the day. And when you haven't eaten and you're doing exercising, you're kind of really going into a big deficit. And then if you obviously need a big meal, you're going into a surplus. So the difference between kind of, let's say, net zero, I guess another thing is the number of hours, you're greater in greater than 300 calorie or so deficit is not a good thing, the more the higher those hours, it's not a good thing. So I don't know if I've explained that very clearly. But basically, you don't have to dig such a big hole at any one time or for a long period of time, throughout the day. So if you've exercised and burn 1000 calories, or even 500 calories in your morning workout, and then you don't eat for another four or five hours, you've done a really big hole and your lunch probably won't dig you that dig that out. And so you're kind of just spending a lot of the day in a large deficit. And then conversely, you're going to be in a large surplus in the evening, neither of which are a good thing from a hormone standpoint.

M

Michael Nelson 22:58

Yeah, and I agree with that. And you think the interval training was similar? Just because that's primarily relying on stored muscle glycogen?



23:09

Yeah, yeah. Eating before a meal wouldn't have really affected your muscle glycogen Well, actually depends how long but most people aren't going to eat like three hours before a morning workout. So let's just ignore that. So most people might eat 20 or 30 minutes or even an hour at most before a morning workout, that's not really going to end up in your muscles. So you're going to burn the same amount of glycogen more or less than the Fed or fasted state. So that's and you generally have enough in your muscles to get you through that workout. If you think about, I mean, the six by three minute intervals, there's really only 18 minutes of work. And so yeah, you're essentially just using your muscle glycogen. That's why I said if the workout goes a lot longer than around 90 minutes, that's when you'll see some real differences in terms of kind of feeding before and during.

M

Michael Nelson 23:56

Yeah, and if people have ever looked or done glycogen depletion workouts in the lab, I mean, you can probably only drive glycogen to maybe 40 ish percent but man to even do

that. It's it's freakin abysmal. It's not any fun. Cool. And if we get more nitpicky on the fat, it's it's cool that I've seen this in a couple of their studies. I know my buddy, Dr. Lenny Lowry did this with a metabolic card, just an N of one. I've done it with my metabolic card at home too. That protein doesn't seem to change the RTR all that much, which is interesting. But if someone is arguing and saying, Well, if you had dietary fat that you consumed with it, would you be quote burning the fat that you consumed or burning the fat from your body fat. If someone is using this purely as we'll say, a hypothetical way to Change body composition?



25:02

Well, probably a mix of both, you got to think, but you got to think about it, the time it's going to take to go through the system. I mean, we did have some peanut butter. So two scoops of peanut butter, I mean, the total calories of the full meal would have been around, I guess, around 280 280 calories. So have that, in this context of protein. Mostly protein with a little bit of fat, and 20. That would have been, let's just say 100 calories of peanut butter. So So yeah, I mean, you're probably gonna burn up a little bit of that, and then a little bit of the fat but actually, this is I think it's almost the wrong question to ask. Because most people, most people think when you're burning fat during exercise, it's like it's coming off your waist or something like that, you know, we're especially the first hour or so of exercise or a bit more, we're burning the intramuscular triglycerides. So these are fats that are inside our muscles already. So I think it's it's kind of a moot point. I mean, I I know you're asking just because people will be wondering, yeah, but I'm not like criticizing your question. But like, it's, it's Yeah. The the fat that you're burning is really from inside your muscles, largely. And then eventually we'll kind of you will burn that that fat from your adipose tissue. But I think people people are interested in this. And it's, you know, it's important for everyone to know what we're burning, but to think it's like, again, coming right off your waistline and into your muscles is just a it's a miss. misnomer, I



26:31

guess.

M

Michael Nelson 26:33

Yeah, cuz I think the, you might even know this. So I'll ask like, the man, it seems like in the past, like the use of intramuscular, triglycerides was just like this big mystery no one really thought of, and then there's some pretty, pretty elegant theories that if you look at just a pure efficiency standpoint, I mean, hey, look, there's a fat droplet right next to the muscle,

huh? Oh, look, there's carbohydrates right next to the muscle? Hmm. Maybe if the body is designed efficiently, those are the things we should use first. And I think it gets harder even looking at a metabolic cart. Right? So we're going to get data on fat versus carbohydrate from the whole system. That doesn't necessarily tell us where it came from. That just says, Okay, here's the amount that was actually used. And do you know what the exact percentage is of intramuscular triglyceride now versus just still say, to keep it simple, General fat that's released into the bloodstream via lipolysis? from other areas in the body?



27:42

Yeah. I could probably find it fairly quickly. But um, off the top my head? No, but I know it does change. So earlier on an exercise, it's mostly the instruments, low triglycerides. And then later, again, it's kind of it kind of shifts. Also, it's a little bit intensity dependent. I don't know, just one clean answer. Adding some complexity is there's there's that those things can be stored. There's different ways to kind of measure those intramuscular triglycerides. And so there's, it's sub cellular, like, like, within the cell, there's, there's, there's a What is it? Like, there's two different areas of the of the intramuscular, triglyceride, the lipid droplets. So even though there's some there's some, I guess, like discrepancies are kind of questioned depending on how you analyze it, the type of kind of staining and things you can get kind of different information. So all that is to say, it's, it's pretty complex and not not super well understood by even the people researching it, and certainly not by me. But the big picture is, yeah, it's gonna come from there first. And actually just started to add to complexity, there's differences in type one versus type two fibers. So we have a fast twitch and slow twitch fibers. And so the words I looked for was central peripheral. So there's, there's like limit the number of them in the central and peripheral regions of both the type one and type two fibers. So like, it's, it's, it's complex. And and, yeah, that's the best I



Michael Nelson 29:20

can tell you right now. Yeah. And I think the only way you can get out of this, even some tracers are, you know, Mrs. or something like that. And, yeah, and even those techniques, which I'm not an expert in all hair, super interesting, but they all have their own limits, too. So it's not like that's going to give you the perfect picture and then you toss in different types of athletes and what they had before in their aerobic fitness level. And we know that how well some people just use fat in general, some people are pretty good at it. Some people are pretty horrible at it. So a lot of variability. Yeah, actually, that's



29:55

a good segue one other I think interesting one of the most interesting findings from this Last study. I don't know if you have it in front of you. But there's a figure and I guess you'll you'll do you have a show notes page or anything like this? Oh, well



30:08

added to it for sure.



30:09

Yeah. So there's a figure figure three. And what it shows is the individual data points. So basically, across each intensity, so we would expect the ratio of carbon fat burning to steer towards carbs as the increase of increasing intensity, I'm sure most of your listeners know that. But the difference in the diet so that you're actually the treatments that condition the carbohydrate breakfast, or fasted, or protein, there's, again, there's differences between them, which gets smaller as the intensity increases, but the difference between people is way bigger than the difference between diet. So what that means is someone who's, you know, a good, let's say, a high fat burner, when they had carbohydrate treatment, they still burned way more fat than someone else who was in the fasted state. So all that say that the intra, or the inter individual variation, so differences in people in terms of fat and carbohydrate burning is way bigger than, you know, if someone decides to have carbohydrate or, or fast before an exercise.



Michael Nelson 31:10

Now, that's, that's super cool. Because that sort of fits in I guess, not just my theory. But if someone is very metabolically flexible, and they're doing lower intensity work, and they've they've trained that system to be good at using fat. My thoughts are, and this kind of sort of supports it that a lot of other stuff isn't going to, let's say matter as much compared to you know, someone else who just isn't really good at using fat during lower intensity, you know, work. I think that in the population, people want to fixate on the thing, right before they did training. Right. So, bro, I'm only doing fasted training. So I'm really burning a lot more fat or oops, I had a bagel, oh, I'm doing low intensity work. Oh, it's all ruined now. But they tend to miss the bigger picture of, you know, what is your $\dot{V}O_{2\max}$? What is your aerobic base? Like? How? How well are you at using fat at a lower intensity? Which I think is trainable. Which I would ask you that question. But I think they miss out on the just the big picture. And they get like hyper focused on these small things that you know, the

study would also agree that don't matter as much as what we think. Yeah,



32:36

yeah, there's a lot we could talk about in there. And I think one other this really cool study that just came out, the author first authors Mark fell. And I could share this with you but but that the title of it for those keeping track is called carbohydrate improves exercise capacity, but does not affect sub cellular lipid droplet morphology, and became p 53. signaling and human skeletal muscle. So that's actually that they looked at the fancy, long title, but the that's where they looked at actually there's differences in intramuscular triglycerides, but the thing that that the reason I brought it up what they had, they basically carb loaded people they just gave them again, from a practical perspective, they tried to emulate what a pro cyclist or a high level cyclist might do. They blasted them with carbs, I think it was 12 grams per kilogram the day before, extremely quick. And then they had them ride for three hours, but one group was getting no carbs during Oh, and they also had a big ass carb breakfast, maybe 140 grams of carbs or something like that. And then they got either zero or 45 grams of carbs per hour or 90 grams of carb per hour. So imagine carb loaded fully carb loaded a big carb breakfast and 90 grams of carbs per hour. Many people might think, oh, they're not going to burn any fat during exercise. Right? So I guess it's a reasonable thing. Actually, they burned a ton of fat, but it took a little longer at first, they're burning more carbs, but they're still about, you know, they wrote for three hours, that second hour, the second and third hour, especially the third hour, even at 90 grams an hour of ingestion, they're still burning mostly fat or a ton of fat. Their fat oxidation rates were up around point eight grams. Where is it? Yeah. Around point eight grams per minute,



34:15

just really high and what intensity exercise



34:19

is moderate. Okay, got 2%. But like, no kind of somebody could basically somebody could hold for three hours. Yeah, still working. So all that is to say the duration of exercise is an underappreciated thing too. So like I said, everyone's so worked up about fasted, let's say, if you don't exercise very long, it doesn't really matter if you exercise long enough, it doesn't really matter. From the other point of view, like you're gonna burn a ton of fat as exercise goes on. That again, was an extreme case of, like I said, massive carb load and as much carb per hour as basically people could stomach literally, and they were still burning

a ton of fat as the exercise went on. So, again, the duration of exercise is super, super critical, as well as the intensity. So if you're doing just interval training, and you're fast, if you're doing a short workout and you're fasted, you're doing interval training, you're still going to be burning a ton of carbohydrate, because of the intensity angle. And if you're doing a long workout, you'll be burning more fat. But what if you could still eat a ton of carbs, and at a time, it's just going to take a little bit longer, you know, there'll be a little bit less than if you were fasted. But at a point, you're still going to be burning a ton of fat. Does that make sense? I know, jumping around a lot of things. But But hopefully, that's all that makes sense to people.



Michael Nelson 35:39

So if someone is listening, and they want to increase their body's ability to burn fat, what would you recommend? They want to be a quote, better fat burner, which Yeah, I know, that's an overused,



35:52

a lot of people assume that, I'm going to do faster training, and I'll be a better fat burner. reasonable assumption, I don't think that's the case. My next study is that I'm just going to starting and it's going to be going on for a while, but as part of my PhD is to look at those same three breakfast options. So the same thing I just described for this study, but before low intensity training, so basically a training program for low intensity sessions per week, and then to interval training sessions a week, so the four low intensity sessions per week will be performed. Like I said, with one of those same three breakfast, so either fasted or with the carb breakfast or the protein breakfast, and then the two interval training sessions will be fed and everyone will have the same breakfast just kind of like a mixed small snack, like a bar type of thing. And so we'll see if fat oxidation changes. But the key thing, the really important thing is, if we look at studies, if you're testing someone in the fasted state, yeah, you might see an increased fat oxidation from people that have done fasted training. But if you test them in the Fed state, meaning you give them any kind of just standard breakfast, I don't, there's usually not a difference. Okay, that's a really important thing. So that means, yes, in the fasted state, you might get a little bit better burning fat. And so so from a practical perspective, it might be easier for you to do fasted training sessions at overtime. But if you're like thinking about applying this to any kind of, let's say, race, or you know, even if it's like a, just a recreational 10k, or something, to think that if you've eaten breakfast, then you're still gonna be better fat burner. That just doesn't seem to be the case. Again, there's there's actually not a lot of great research in there. And that's why I mentioned earlier, there's, there's people assume there's a ton of research in this area, there's really not, especially in trained people. So I'm really excited

about the study, again, just getting up and running. And it's it's, it's tough to get participants, you know, it's a big commitment for people. But that's, that's what we'll be testing. So to your question, how do I burn more fat? Well, what the first question I think, is why and I know, you're kind of just being straight out there, because people want to know, and if you're competing, I think Ironman distance and beyond those kind of ultra distance events, I think there's there's a real reason to, there's maybe a reason to consider that. Most people aren't doing that. I don't I think just simply training is going to be the best way to be a better fat burner. If you look at trained versus untrained people, train people burn more fat, how have you want to quantify that as far as their maximal rate of oxidation at a given workload? However, the training response, just the kind of classic response to endurance training is you rely more on fat compared to carbs at a given workload. So you start at and let's say you're exercising 150 watts on the bike. And, you know, normally, to start with, you might be burning, what 75% carbs, 25% fat, well, over time that that ratio will switch, that's what's going to happen just just by training itself. Now to think, Oh, I'm going to be better at burning fat by doing fasted training. Again, like I said, Maybe they're only during those sessions, when you're fasted, you might be a little bit higher. If you're low glycogen, you'll definitely be higher. But as soon as you're fed and have a, let's say, normal glycogen level, those differences will almost certainly get washed away. Yeah, you could go on a low carb diet, you can lower it. So lowering your glycogen level or going on a low carb diet are ways to be a better fat burner. But again, what's what's the end? Do you want to be a better fat burner for the sake of burning fat? Or do you because you think is gonna help your body composition or from a health standpoint, you can also look at healthier people generally, are better, more metabolically flexible. But that that doesn't mean you need to do fasted training. That means you need to do training, like say trained versus untrained people are going to be more metabolically flexible, better fat oxidation, capacity, things like that. So if you're looking at a health perspective, simply doing the exercise training, endurance type of training generally, is going to improve that. That'll make sense.



Michael Nelson 39:51

Yeah, no, that reminds me of the study. disagree. Exactly.



39:56

Oh, go ahead. Sorry.



Michael Nelson 39:56

Oh, no, I mean, I don't really agree. Reminds me to study a George Brooks's lab that I can't remember if he was the primary author who the primary author was a couple of years ago, where they compared the crossover points and looked at metabolic response, using lactate in place of carbohydrates. Yeah. And but the cool part was they compared pretty high level athletes, I can't remember their vo two Max, but it was pretty decent to think it was type two diabetes patients, I think. And the train people in every sense of the word just blew the other group out of the water, you know, in terms of the amount of fat burn the percentages, and the thing that I think exactly what you were saying that people miss is just the wattage Is this the sheer workload they could do, because they're trained is that much higher. So even if you were not burning, let's say 10%, less fat, you know, you were up at, you know, kicking it at, you know, 450 watts, you know, the other group was like, barely breaking 200.



41:06

And I think that, again, from the practical perspective, what that translates to is, the number of calories you're burning per minute also. So you can look at, you know, grams, grams of fat per minute, or calories per minute, someone who's, you know, if you have a higher view to Max, you're going to be able to burn more calories per minute. And so that's going to kind of also translate to more fat being burned, you could be burning 100% fat, but if you're going out 100 watts, you know, you're barely burning anything, and because it just doesn't, there's not a strong metabolic demand for calories. Whereas if you're at 400 watts, you know, you're burning a ton of calories. And so you know, thinking about getting, you want to have a metabolic flexibility, you want to be able to both carbs and fat. And, again, best way to do that is to have the raise your your, your get the maximum, raise your threshold, so you're able to just burn more, you know, make more energy.

M

Michael Nelson 41:56

Yeah, I explained to clients as maybe your one rep max, if we use a very overly simplistic version of metabolism of aerobic versus anaerobic, which, that's another four hour discussion, that's probably not completely accurate. But if we use that as a simple explanation now for on the lifting side of the equation, you know, the size of your engine is around a warm around. And then on the aerobics size, the size of your engine is your vo two Max, like how much oxygen can you run through the system. And if it's, you know, bottom 20% of the population, I've actually tested some people who have been there. Even just getting them to 50% of adjusted population, like, every single one of them across the board, felt better, their body calm, got better, their health improved, everything

got better. You know, I think it gets a little bit dicey or when you're, you know, trying to get to 75/90 percentile, maybe warranted, maybe not depends on the sport depends on what you're trying to do. But I've just noticed the last three, and about three years, I've been doing this now that I want to smack my head against the wall and go, Well, why did I never check this before? It's like, Oh, I never checked it before, because I assumed it was good. And when I started testing it in some people, it was, ooh, really bad. And another people you tested, you're like, Okay, that's acceptable. But we're not gonna worry too much about it. It's not going to be a massive rate limiter. And we'll just kind of go on our way.



43:35

Yeah, yeah, no, that's it. It's funny that, you know, I'm a registered dietitian, and, you know, obviously, has spent a lot of time thinking about nutrition. I'm doing my PhD and how pre exercise nutrition affects things. But the more I learned, the less I think it's sometimes nutrition matters. I will say some sure there are people asking them, Well, is there a benefit to fasted training, and I think there might be it just that it's not in terms of making a better fat burner, you know, long term. And I think the benefit that there could be some benefit to kind of that flux through the muscle. So if we think about even if it is coming from muscle glycogen, and your inner muscular muscular triglycerides, that's probably good to kind of, you know, shuttled us through, although that said, it doesn't change too much from the Fed state. So there's some reason to think that inner intramuscular triglyceride use might be reduced in the Fed state, there's also reason to think that it's not so again, that's where it come back to some contrasting methodologies. And so it's a little bit unclear. But if there's some benefit, you know, maybe just shuttling through some more, you know, substrate that you have on board to start with that's, that's probably and then depleting your tank, and then having breakfast let's say that, you know, your glucose control might be a bit better. Well, depends. If you're for diabetics, that might be a bit different, actually. But there might be some reasons to kind of emptying the tank, so to speak. And then and then eating from a from a insulin standpoint, or insulin sensitivity standpoint and things like that. So I'm not saying that there's no reason I'm not saying people should definitely avoid it, I think the people who should avoid it are people doing high volume of training, you know, and in that case, they are, they're already going to get all those benefits. If someone's training, you know, exercising more like three to four hours a week, for, you know, four hours a week, there's probably there might be some benefit, that might be some reason to do that. I don't think it's something you have to do. But if you want, I don't think it's like a bad thing. So I want that to be a little bit clear, too.

M

Michael Nelson 45:26

Yeah, I mean, that's, that's my bias. And I'll get to that in the party brought up about just clearing out some of the substrates or something I've spent a fair amount of time thinking about, and I think, I don't have a lot of data to prove this. But doing glycogen depletion work once in a while and not replacing glycogen, I think may have some benefits. So in the flex diet, search shameless plug, I just call that a distress training, right? Where you're purposely miss matching macronutrients, you're prioritizing, you know, molecular adaptations at the cost of performance. And I think there's a, I'll find the study if you need it, but they did glycogen depletion work. And I think they may have only given protein overnight, and they came back to the lab the next day. And I believe amtk was upregulated for five days in a row, I think. So just all these people doing all this crazy stuff of like, you know, fasting because of a toughie, G and amtk. And I think we've kind of forgotten that, you know, if you're doing glycogen depletion work, and then you're not repeating it right away. That's a pretty big molecular signal, or at least that appears to be, and similar to what you were saying, I, I'm still a fan of doing fasted work, if it's low intensity, I do think that, you know, there may be some hedging of your bets of just flowing more fat through the system, you know, yes, insulin at some level, though, it's confusing, because it's not a linear response. If you whack insulin super high, it's gonna push you to use more carbohydrates. The hard part is, everybody's different. You know, it's not a linear response. So I'm still a fan of people doing fasted, you know, training, because it's easier, less hassle, all that other kind of stuff. But yeah, you know, the longer I've been looking at the data, and like you said, there's not a lot of it. I think that the, how robust you are as a physiologic organism matters more than all of that, right? I remember, like, the first training logs I got from a couple elite track athletes who were like, no top runners in college, at least, not maybe not Olympic level, but you know, pretty high level. And I thought the coach was just dicking. With me, I'm like, there's no way I'm like this, there was like, fast food and like, I was just a bad week. Let me go get go record everything for a week that like, same thing again. And I'm looking I'm like, it's a track athletes. So everything they do is timed. So you can look up their times and see how they rank. You know, it's very easy to quantify their, you know, performance. You're not just saying, oh, the coach says this is the greatest athlete ever, you know, and I'm like, Huh, like not, maybe if you're kind of a genetic freak, and you're super metabolically flexible, and you're getting enough calories, maybe you can survive for a while. Not saying I would recommend that to everyone. And then



48:37

avatar body's amazingly flexible. Yeah,

 M

Michael Nelson 48:39

yeah. Yeah, of course. Everybody wants to know, like, oh, did they get so much better when you did nutrition with them? And actually, they ended up firing me because they didn't want to change this restriction. They're like, we're already running this fast. We don't care was basically their attitude. Okay. I don't know. Yeah. Cool, man. So do you think that there may be some benefit to faster training in terms of metabolic benefits in the future in terms of adaptations, or do you think that it's hard to say, and it's probably more minor?



49:18

Personally, I think it's more about the acute benefits. And in terms of adaptations, well, yeah. Adaptations, if we're thinking of like getting faster, let's say endurance training related adaptations. I don't think there's much there. Yeah, I do agree. Again, there might be more from a health standpoint. And just like I said, flushing, getting getting stuff flowing through the system, I guess, a little bit differently. There's, I think with it's almost like that there's reasons that you could argue that there's potential reasons that it could be benefit long term, like having more fat free fatty acids signaling, there's reason to think oh, that could add some signaling that you know, related to training adaptations, but I just feel like when people are trying to make those points Like, here's the reason it could be beneficial. But the studies so far don't really show it that much. But like I said, I think it's I think there's a benefit. If someone's on a hyper caloric diet, especially like hyper caloric high fat diet is because a traditional Western diet and over eating, there's probably some metabolic benefit. So yeah, I think there's, there's a reason to do it. It's just not the reason most people think it is.

 M

Michael Nelson 50:22

Yeah, I always tell clients, it's like, okay, you're doing all this shit to like fine tune your three cylinder, Hugo engine, you just need a bigger engine. And like, well, we'll do some of that. And I think it might be beneficial. But at the same point, we're going to measure via to Max, we're going to try to increase that, you know, we're going to look at a bunch of other stuff, too. So it's, you know, more of the big picture.



50:47

Exactly.



Michael Nelson 50:48

Do you think how well, people use fatty acids, in general is a good marker for metabolic health?



50:59

Probably, you know, it's not something I look too closely at. But I would take venture a guess that trained endurance athletes, probably, you know, have bet do better in that department than untrained people. And so that that probably comes from no increase in mitochondria, and just being able to have machinery to process that easily.



Michael Nelson 51:18

Yeah, I mean, that's kind of my bias, too. I mean, it, it gets messy, again, because aerobically, you can use both fats and carbohydrates, but, you know, my bias is fats are going to be a little bit cleaner at lower intensity work, there's some, I would say, is not the best data, that kind of hints that, you know, your level of, you know, just run fats through the system is probably a marker for health, we know that, like in type two diabetics, which is kind of not appreciate it is or thinks of it as kind of a carbohydrate disease, which you definitely start having issues in the carbohydrate and into the spectrum. But as the disease progresses, you definitely end up with, you know, issues using fats for fuels, too. So you get kind of discouraged from both ends, you can't, you know, kind of down regulate all the way to run a massive amount of fat through the system, you can't upregulate to run a bunch of carbohydrates through the system, you're not able to switch back and forth, you're just kind of, like stuck in the middle. And that causes all sorts of metabolic consequences. And too,



52:21

yeah, so that's just, you're just describing obviously, metabolic mitochondrial dysfunction. So the things that are making the energy is not working well. And what does endurance training do Is it not only builds More, more, but it kind of remodels, you know, breaks down. Coffee, geez.



52:41

So there lots of burning out there, as it breaks down.



52:45

Oh, my toffee G. So that's, you know, my cup of tea is a part of it. So is that we think of mitochondrial biogenesis and making more mitochondria, but there's also my toffee G is a key critical part of that, which means, you know, you're breaking down some and then rebuilding them. Yeah, so again, training is going to is that is the kind of the key and then the endurance training. Like I said before, that the hallmark, a hallmark of endurance training is at a given intensity, and whether that's even just walking around, you're going to rely more on fat than carbohydrates. So baking, making better and more and better mitochondria is what training does. And so yeah, that's, that's why it's the amazing thing that we'll never can't you can't really put in a pill.

M

Michael Nelson 53:24

Yeah, yeah. It's, it's always fascinating to me how many guests you can save. Formerly, we've been looking at exercise physiology for 100 years if you count AV Hill, but obviously people have looked at it. Well, well, before that. And Russell just figuring out benefits of exercise now. It's like, Oh, yeah, I think there was something recently that muscles primarily release, BDNF, some brain derived neurotrophic factor, which then goes to, you know, neurons in your head to help increase neuronal health and things, you know, neurogenesis, things like that, possibly, that it's just fascinating to me how muscle and even you know, neurons are communicating back and forth. And we're still, you know, when they discover irisin was, what, eight years ago, nine years ago now, like these compounds and muscles succeeding, and we're still finding new ones, which just blows my mind. Yeah. Cool. Well, thank you so much for sharing all the new data there. I really appreciate it. Um, do you work with any clients or anything now? Are you just full time PhD to get it?



54:37

No, I still, I still do work with some people. I certainly visit my website is eat sleep dot fit. People can see. You know, I do see a few people just via zoom just because it's an enjoyable part of what I do is as well.

M

Michael Nelson 54:54

Awesome. And people can conduct you through the website, then is that correct? Yep. That'd be great. Yeah. Have any written articles or on the website then to or social media areas?



55:05

Yeah, exactly yet. Facebook, Twitter, you know, kind of the usual you can probably find me pretty easily.



Michael Nelson 55:10

Just look up Jeff Rothschild, I assume.



55:13

Yeah, yeah, that would be



55:15

I think my twitter i guess if first for someone who's curious, sure. No one's like waiting to write this down. But my Twitter is at eat sleep fit. Jeff. can find all the stuff through there?



Michael Nelson 55:28

Awesome. I think it's been two and a half years since I've been on Twitter. But I like



55:34

it. It's probably been only been on there for about two years, but I don't really I actually think it's pretty interesting and useful. Yeah. Nice. Well, thank



Michael Nelson 55:43

you so much for all your time and sharing everything today. I really appreciate it. And it's always awesome to have the primary authors of this study, you know, come on, we get to ask, you know, questions about too, because I think, as you know, designing the study, by virtue of doing one thing, a lot of times you can't do something else. Right? So yeah, I've just learned a vast majority of time, if you email the author, and you're like, Hey, why don't you do this, instead of that, it, there may be something related to physiology, like we talked about, and maybe related to psychology, and maybe related to, you know, the equipment in the lab, and people, they got to even be tested, you know, there's all these other things that go into it. Because at the end of the day, you can design this, quote, unquote, perfect study, but if you can't get people enrolled, you can't get any data and it

never gets published. So you're always kind of walking this, you know, fine line of doing things that are, you know, super useful, are going to move stuff, you know, forward. But you know, you also have to get it done and get it published, too. So it's a lot more things that go into it than what most most people realize.



56:53

That's exactly right.



Michael Nelson 56:55

Cool. Thank you so much for your time. Really appreciate it.



56:58

My pleasure. It's always nice to chat.



Michael Nelson 57:00

Yeah, thank you. Thank you so much for listening to the podcast, really appreciate it. Big thanks to Jeff for taking time out of his very busy schedule. to chat with us make sure to check out his website there. He's got really great stuff. honored to have him on the podcast to discuss his brand new research, which is not only interesting, it is actionable and something that you can implement right away too. And, of course, lots more questions to hopefully be answered with future research. Big thanks to Jeff podcast today, as always, brought to you by the flex diet cert, go to flex diet. com and you'll be able to get onto the waitlist. There we are in the process of applying for SSI use. By the time you hear this we will have applied for CrossFit, we applied for nsca nasm, and hopefully AC e also. So those are all in process. Again, I can't say if they will or will not be approved, but hopefully Fingers crossed, they will be missed. They'll have a couple other ones in process too. So in the future, if you're listening to this, you can double check to see which CPUs are available. So go to flex diet comm get on the waitlist there, you'll get all the latest and greatest info. And if you'd like this podcast, if you could do me a personal favor of putting a review or even just comments on your favorite podcast listening singer, whether that's iTunes or Stitcher or whatever, that would really help me out. Because I'm the one sponsoring the podcast through the flex diet cert so far to date. I haven't taken any other advertisement money or anything like that. Not that I'm against it, but I just want to have the freedom to discuss whatever I think is interesting that will hopefully help you with body composition, performance and do it all

