Danny Lennon: Hello and welcome to Sigma Nutrition Radio, the podcast that brings you evidence-based discussions with the world's leading researchers and practitioners in fields related to nutrition, health and athletic performance. I am your host, Danny Lennon, and you are listening to Episode 154. And on today's podcast, I'm delighted to have Jeff Rothschild back on the show. Jeff was only on recently talking about some of the cool research in sports nutrition that relates to glycogen availability, training and other relevant topics and how to actually put that into place with athletes. But during that, we mentioned how one of Jeff's main areas to look at in regards to digging into the research and then also applying that with people was around the idea of fasting and also time-restricted feeding. So whilst Jeff is a registered dietitian, he also has got a master's degree in nutritional science, his main areas of interest along with sports nutrition are related to meal timing, interest fasting and circadian rhythms. And he has coauthored multiple scientific research papers that have been published in peer-reviewed nutrition food science journals including stuff on this topic, and it's been something that has for me been a really fascinating topic to look at and to consider and to also see where the possibilities are at this because there are still a lot of questions to be answered on it. So Jeff has kindly come back onto the show and we're going to dig into some of the research around time-restricted feeding and intermittent fasting protocols.

The show notes to this episode are going to be over at SigmaNutrition.com/episode154, and also if you've not already done so, you can sign up to receive the transcripts to each podcast episode, which will be delivered direct to your inbox as a PDF completely for free.

And just before we begin, I just want to remind you guys who are interested in the Sigma Weight Cutting system for MMA and boxing. So this system is essentially a step-by-step science-based blueprint of how to fuel your training, how to cut weight in the most effective and optimal manner possible, and therefore fight and perform at your absolute best. And so really for anyone who is competing in MMA, boxing, Muay Thai, any combat sports or even their sports nutritionists or maybe you're the strength and conditioning coach for some of these guys, I think this will be of tremendous value. You will essentially have a comprehensive manual, explanations via video content, and then a ton of resources that you can essentially use to customize and create your own diet and weight cut protocols specific to the athlete. So for more details of that just go to SigmaNutrition.com/weightcut, and this is all the one word, so SigmaNutrition.com/weightcut, and you'll get more details of our weight cutting system. So with that, let's get into this week's podcast episode and let's get Jeff Rothschild on the line.

Jeff, welcome back to the show. How have you been keeping?

Jeff Rothschild: Thanks, Danny. I'm doing very well, thanks. I'm glad to be back.

Danny Lennon: Yeah, it's great to have you back on. I think it's something we had discussed previously because today's topic is of course a huge one and something you've looked at quite a lot, and the reaction to your previous episode was so big that I knew I had to try and get you back on as soon as we could. So we finally managed to arrange it, and of course today we're going to look at some of the areas related to intermittent fasting or time-restricted feeding protocols and then both the science but then also a lot of the application to that. But before we get into the whole topic, maybe for listeners who are new to the show or who didn't catch your previous episode, can you just give a quick rundown of who you are and the type of work you primarily do?

Jeff Rothschild: Yeah, no problem. I am a registered dietitian, I have done my master's degree in nutritional science, and I work in a private practice setting in Los Angeles, California. So I work with a lot of athletes and a lot of non-

athletes, and they range from recreational gym-goer to very elite high-end athlete and, again, to just that kind of sedentary office worker.

So I guess to talk about my interest in fasting, I had planned on doing a PhD and maybe that's something I will pursue in the future, but leading into that fasting was an area of…just seemed so interesting to me and so fascinating and the research that was, you know, there's not a ton of it but I got really deeply involved in it. I did publish a review paper on the available research at the time on time-restricted feeding windows, which was mostly in animal studies, and it's just such a fascinating area. So I'm really thrilled to be able to talk to you about it today and it's definitely something that I use in practice both with non-athletes and athletes, depending on the type…you know, the situation. There's a lot of different ways to use fasting and we can I guess get into some of the different methods today.

Danny Lennon: Yeah, sure. I think that's actually a really important distinction because a lot of people will have heard the term "intermittent fasting" and may have even looked into particular type of fasting protocols but of course, as you said, it's quite a large umbrella term almost that there are so many different things that could encompass some degree of fasting. So when we're talking about nutritional methods or certain types of feeding patterns or protocols that people may be looking at, maybe we can start this discussion by maybe separating out different types of fasting methods and how we can kind of classify each of those.

Jeff Rothschild: Yeah, absolutely, and that's super-important and it's almost…it's become a little bit of a pet peeve of mine when someone says they're doing intermittent fasting and they just take that…they assume that refers to eating between noon and 8 p.m. For some reason, that's kind of become…it's common. I mean, it's…and I understand why it's just that's a lot of times the method that people are exposed to. But I guess we should consider fasting to be a catchall term, like you said, for purposely skipping some type of what would be previously normal eating occasions or even restricting some type of food group throughout the course of a day or week or a month.

So, broadly, we could think about them as like a random meal-skipping. So let's say someone just eats breakfast and lunch and then they skip dinner and then just continue on normally the next day or skip breakfast, etc., so this could be a type of fasting. Sometimes it's unplanned or even

not thought about but it's certainly a type of fasting because you're skipping a normal eating occasion.

Then, you can take that a little bit further and there is something called "ultimate day fasting," so literally eating normally one day and then the next day either fasting completely or having up to 500 calories, so about 25% of your intake. That's technically referred to as "alternate-day modified fasting," but it's kind of become synonymous with ultimate day fasting. There is a lot of research in that. Probably one of the most well-researched type of fasting is alternate day fasting.

And then kind of similar to that and it's just not studied as much but I use it actually quite a bit is something called like a 5:2 diet, which is effectively two nonconsecutive days per week of fasting or about 500 calories. So it's kind of like alternate day fasting but just a little bit less rigid in that it's not literally every other day but twice a week.

Then you get into the limited eating windows or time-restricted feeding windows, which is what I alluded to earlier. So you put all of your food within some set number of hours. It could be eight to 10 or 12 hours. So if I start eating at 10 a.m., I'm going to finish eating by 6 p.m. or, as I said, a lot of people just assume noon to 8 p.m. is what they should be doing. And there is a growing amount of research in that and really interesting in animals on that. The human studies, so there's just a few and we could talk about those in a little bit. But, certainly can be beneficial, and the interesting distinction there is that you don't really have full days of unrestricted eating as much as just certain times within each day where it's unrestricted.

And then there's even limiting your food options. So most people don't think of that as fasting but a lot of the religious fasting, Greek Orthodox religion, is…well, actually, this is a really interesting one because the Mediterranean diet, most people would consider that among the most healthy meal patterns. So for those that aren't familiar, it's…well, obviously, the Mediterranean region, people consume a lot of nuts and olive oil and fish, and what people don't consider is that the Greek Orthodox, people from…that were originally on that diet, they would have 180 to 200 days per year of some type of dietary restriction but it wasn't always complete fasting. So for example, they would avoid olive oil, meat, fish, milk, eggs, and cheese like every Wednesday and Friday except during certain weeks of the year. So without going too far down that path,

you can have…you know, it's not only off and on but it's also…you know, can be food group restriction.

Danny Lennon: Mm-hmm, yeah.

Jeff Rothschild: Oh sorry, go ahead.

Danny Lennon: No, I was just saying that's a really interesting point and it's maybe something we might get into later on when we discuss some of the benefits particularly for maybe some of the like autophagy and cellular repair, the stuff that's related to fasting, and people discussing fasting just from protein as opposed to from all food. It just kind of reminded me when you discussed fasting can be from a certain type of nutrient or a type of food as opposed to from everything. But yeah, I think this is really important that there's that classification.

Jeff Rothschild: Yeah.

Danny Lennon: Sorry for jumping in.

Jeff Rothschild: No, that's okay. Feel free. And then the last one I was just going to consider is a longer fast. So this could be two to five days or sometimes seven days and there's utility for this. Obviously, it's practical and you won't do this as often or on a regular basis the way you might just keep your food **in a** [00:10:59] window, but there are definitely some different benefits once you get beyond about the second day, maybe 36-plus hours of fasting, and you've really depleted your liver glycogen and it sets you into a new kind of range of physiological effects. And I know a handful of people that have done seven-day water fasts. That's not something that I would want to do, but there are alternatives to that too and there's something called a fasting mimicking diet that Dr. Valter Longo created and that's kind of a five-day…well, as it sounds, it mimics the effects of fasting while still giving you some food, and that's something that I've used myself and with clients and we can get into that too if you'd like.

Danny Lennon: Yeah, for sure. So I think that gives people a good overview of we go all the way from something that's almost on a daily basis with some of these time-restricted feeding windows, so a lot of people listening may have heard of something like Martin Berkhan's Leangains, for example, and then we can have maybe fasting alternate days where there may be some calories or maybe not. That could include something like a couple of days per week as per the 5:2 diet, which I think also kind of went mainstream especially in the UK a couple of years ago, all the way then to maybe

longer fast, 24 hours plus, and like you say into multiple days. So with all these different types of dieting protocols, from just a general standpoint before we get into the specifics of each maybe, where do a lot of the potential benefits usually get reported of—because we know for example it's big in, say, the longevity [00:12:38] people are trying to look at how fasting/caloric restriction plays in. Then we have people looking at body composition, we have potential effects on mitochondrial function, all this other stuff in the cell. So from what you've looked at, Jeff, are there different types of benefits that we can classify into different areas that fasting potentially has a role in?

Jeff Rothschild: Yeah. So shorter daily fasts, something like a time-restricted eating window, the benefits from there, you might think of shorter-term weight loss, body composition, things like that. Definitely, there's utility there. And then as far as the longevity, that's a really good question, and whether or not animal studies translate to humans I guess in a lot of ways it's kind of the million-dollar question, but as you mentioned, autophagy and these things that don't really start kicking in to a more substantial degree until you get to these longer fasts. So yeah, so I guess you can kind of pick your maybe desired goal in the short term.

A really interesting point about longevity though, and again, Dr. Longo would...there are a number of interviews you can find where he speaks on this, but the difference between fasting and calorie restriction, you know, a lot of people I think erroneously lump them in together and a lot of people will say, "Oh, you're getting the benefits of a fast just because you're reducing calories." Well, yes and no, because calorie…like, so just to define a calorie restriction, we could consider that a daily restriction of anywhere between let's say 10 and 40% of someone's estimated needs, and there are people that do long-term calorie restriction so they just eat a very low-calorie diet in the hopes of improving their longevity. But calorie restriction is missing one of the most important components, which is actually the refeeding, right? So, especially in these longer fasts, in these like three- to five-day or seven-day fasts, you're getting the autophagy, you're getting apoptosis, so there's cell death and cell kind of digestion. And so the rebuilding signal when you then refeed, that's when you're rebuilding the system, right? And so with calorie restriction you're not getting this real on-off switch, is a good way to think about it, where it's just kind of constantly like dimming the lights and there's definitely…you could argue maybe some benefits to both sides but I think there are a lot of

benefits that, again, people aren't considering when they're lumping in calorie restriction versus fasting.

Danny Lennon: Right, and would that be down to…potentially something down to the hormetic stress of this or the disturbance in hormesis is going to be greater when we have this large restriction via fasting followed by then a refeeding, and that's potentially going to be better than a constant intake across the day all the time, that this kind of cyclical nature of the intake is having the benefit or do we know what it's coming down to?

Jeff Rothschild: Yeah, that's a good question, and actually you mentioned that it's a hormetic stress and I've for a long time thought that way and said that and agreed that it's true, but in other ways fasting isn't a stress. When we break down food, I mean, that actually is a stress on our body, right, that causes oxidative stress? And so fasting is kind of a way to almost protect your body and shield it. So it's, again to kind of quote, or paraphrase, Dr. Longo, if you think of like a Program A and Program B where Program A, it's not that it's…it's two different environments for the body. And so we have this on a small scale during overnight fast, but when we get into these longer fasts you have Program A which would be like fasted mode and your body is protected and shielded, and then Program B is really like rebuild and regenerate things. So again, I think this differential on/off switching is really, really important.

Danny Lennon: Mm-hmm. You mentioned that point that sometimes people make to you about that, "Oh, the benefits of fasting are purely from the caloric restriction that it's inducing." So if we're to say then there's actually a difference regardless of that caloric restriction it induces, is it plausible in any way that there could be differences in body composition, first of all, if we look at that metric? If we're going to see a difference in body composition between two different feeding patterns, one where we have a time-restricted feeding pattern versus a normal typical feeding pattern, even if we end up matching their total caloric intake and the macronutrient intake, the activity of those people, is it possible that we could still see some difference based on whether it's a, like we say, a normal typical feeding pattern or some degree of fasting protocol where that's time-restricted feeding or alternate day, whatever?

Jeff Rothschild: Yeah. Yeah. Yeah, absolutely. So there are definitely animal models that show that the benefits of fasting are separate from caloric intake, and also even in humans there's a brand new study, some people have kind of referred to it as the Leangains study in reference to Martin Berkhan as

you've mentioned before. The first author's last name is [00:17:42] **Morrow** and it's basically—are you familiar with that? It's a time-restricted feeding study and they were…

Danny Lennon: Yeah.

Jeff Rothschild: Yeah.

Danny Lennon: I can link to it in the show notes for people listening…

Jeff Rothschild: Yeah. So basically these people were eating between 1 p.m. and 9 p.m., so an eight-hour eating window. They were exercising. It was a supervised resistance training program three days per week in the mid-afternoon, the late afternoon. So they were working out not in the fasted state. And a normal diet group consumed the same three meals but just spread more traditionally through the day. And of course there are some potential reporting errors or things like that, but the groups basically were reported to have the same intake and the group, the time-restricted feeding group, had better body composition. They lost fat, whereas the other group had no changes. So of course one study, and you know, you can argue some various flaws with the food provider and things like that, but definitely would support what I would expect to see from some of the animal research.

Danny Lennon: Right. Yeah, that's really interesting because it's something that just I suppose logically previously when people have asked me about stuff I would have typically said that if there are differences people are seeing it's probably that they're not matching their calorie and macronutrient intake between these two different setups, but now we're seeing that even when matched you can see a difference. So when we're trying to peel back and look at, again, because it's early days for some of these studies, we'll probably have to go turn to the potential mechanisms by which this works. From what you've kind of seen of the mechanistic stuff, what are the main reasons that would point towards why there is actually a difference in how those calories are consumed in feeding patterns even if the total intake is the same? Is there anything that points to why we would see a difference in body composition changes?

Jeff Rothschild: Yeah. I've kind of thought about this actually the last few days particularly as I was looking into that study. It's very like kind of I think theoretical mechanistic. So that study we just talked about, so the time-restricted feeding group also had an increase in adiponectin and it's possible—actually, I'm going to take one step back. It's interesting with these studies,

or using it as an example, should the groups be matched for calorie intake or should they just be allowed to eat freely within that window? That's a big question. Obviously, there are two different variables that introduces…because by definition, time-restricted feeding windows restrict when a subject eats but not what or how much, so as soon as you are restricting what or how much you're really taking away some of the practical application for it.

But, so adiponectin, that's a hormone and it can act in the brain to increase energy expenditure. Also, it can increase mitochondrial biogenesis and this is because adiponectin, there's interaction with something called AMPK, **which** PCG-1alpha, which is a key regulator of energy metabolism, so it's kind of…in that study they didn't measure like the mitochondrial biogenesis directly but you could argue that there's some potential connection there that would be investigated in the future. So that's not a great answer for you but I think there are theoretically some ways that you might see some differences. But again, I think the better study, and of course you can nitpick anything, I would love to just see ad-libiting within the window compared to ad-libiting outside of the window.

Danny Lennon: Mm-hmm. Yeah, for sure. I mean, especially when we're looking at widespread implementation of this, it's probably going to be presumed that the vast majority of people are not going to be people who are going to be specifically tracking their calorie and macronutrient intake and trying to fit into potential targets. It's more following set guidelines I think generally for a large majority of people.

One thing that is an interesting question that I haven't really looked at all that much myself is when we look at time-restricted feeding windows, and like you said, typically the most popular that people come across is maybe a 16-hour fasting window followed by an eight-hour eating window, we also have shorter ones that some people may have seen or even kind of longer ones of 12 and 12, whatever, but for any of these time-restricted feeding windows, does the actual time of day when they're implemented have any difference? So whether that fasting is from, say the first meal is at 12 noon and their last one is at 8 p.m., versus them eating throughout the morning and then stopping earlier in the evening, so still maintaining the length of the fast but just having different actual time points in the day, would there be any potential mechanism for that to be different?

Jeff Rothschild: Yeah, I mean, you ask another question that I'm sure people listening might get all…might raise some excitement because I don't know that

there's…there is no direct answer in the research, but if you're asking me my opinion based on what I've seen and I've looked into a lot of this stuff for quite a while, I would say yes. I would say the earlier the better, earlier in the day, meaning basically daylight hours. In the summer, I think you can get away with a later window, but from other research we know that there are a lot of beneficial effects of breakfast for example on insulin sensitivity or blood glucose at the next meal. There's a second meal effect, there's even a third meal effect with a high-protein breakfast.

Now, of course that last study we've been talking about, they skipped breakfast and they still lost body fat. Generally, I mean, the blood sugar control is better earlier in the day, and so if you can pick an eight- or even 10-hour window from 8 a.m. to 6 p.m. or something like that I just think it would be better. That sounds like kind of a lame thing to say from my experience, personally and with people. The problem is it's not convenient for everyone and people with families are going to come home and want to eat dinner. This is why this works so well is because most people are tired in the morning and wake up just in time to get to work and maybe have their coffee. And so that would generally fit in as a substitute for their breakfast, then they can just eat lunch and dinner with their family. So from a convenient standpoint and a practicality standpoint, it does work better later. But again, if we're really asking what I think is optimal and what I would do myself, then it's earlier in the day.

Danny Lennon: Yeah, that timing thing is an interesting one because when you mention having larger meals earlier in the day and keeping that feeding window to, say, daylight hours, I know it's something that the likes of maybe Bill Lagakos has talked about over on his blog before related to a lot of the stuff around circadian biology, and I know you've looked at it from this angle of circadian rhythmicity as well. So maybe before we even get into a discussion it might be useful just to give people some context of when we're talking about circadian rhythms and its kind of influence with diet, we probably have this kind of two-way potential difference, right? We have the potential for when we eat to kind of infect some of that kind of rhythm or different kind of peripheral clocks, but then we also, on the other hand, the circadian rhythms we have kind of affect how we kind of metabolize nutrients. So I don't know where is the best point to jump in on this and it's probably a can of worms, but just from what you've seen and what you have kind of come to conclude, where do you come down on the whole issue of circadian rhythms and how that fits into this time-restricted feeding kind of conversation?

Jeff Rothschild: Yeah, well, it's super-important and actually Bill and I published a paper on this subject as it relates to enteral and parenteral nutrition, so kind of tube feeding and when people are in the hospital and they will, a lot of times, it's very common either to give someone a tube feed or if it's going to be intravenous, either 24 hours continuously or a lot of times people are going to get these tube feedings overnight, so like from 10 p.m. till 8 a.m. or something, and from everything that I've seen and studied and learned I'm going, "Wow, this seems so opposite from when I…" So when I started working in the hospital and seeing that this was happening, it was so bizarre to me, so we got together and we worked on this paper. So yeah, it's—

Well, okay, let me go back. One more thing is people think coffee doesn't break the fast, and so it depends on which lens you're looking at it from. So what I mean by that is if someone says they're putting all their food between noon and 8 p.m., let's say, and then they might take kind of coffee and say, "Yeah, well, because it doesn't raise insulin or it technically keeps you fasted." But what it does do, and actually I think this is a good thing and this is kind of a saving grace for a lot of people, is that it does start your clocks, and I think I've jumped ahead a little bit too much. So, as you say, we have a circadian clock. So we have an internal body clock and I'm sure people are familiar with this concept, but we have a master clock in our brain that gets regulated primarily by the light and dark cycle, so when we're exposed to light and when we're exposed to dark, and you think of that as like the drummer in the brain. So we have like Ringo in the brain keeping time and sending that signal down to clocks; we actually have clocks throughout our whole body. So all the organs have clocks, in our liver and intestine, all these things.

So feeding cycle, so when we eat, this also affects our clocks but it affects our clocks in our organs and not the master clock in our brain, under normal conditions. There are a few exceptions, but generally speaking. So what this means is if your light and dark cycle clock, so the master clock in your brain, is set to one schedule and you're eating opposite of that, imagine it's like the busiest intersection in a giant traffic jam because your liver is getting a signal from your food intake, like you said because there are nutrients coming in, but your light and dark cycle, the master clock is saying, "It's sleeping time," if it's at nighttime, and so it's very confusing and then we have this internal discordance, which I believe is actually…well, it's a big problem and it's at the heart—interestingly, circadian rhythm dysfunction precedes most if not all metabolic diseases

that have been studied, so this is a big problem as you could see if you have an internal discordance.

So getting back to what I said about the coffee, anything besides water starts your clock in the morning. So having coffee in the morning, I think in actually a good way it's cuing your a.m. clock. So having coffee would probably be better than not having any coffee if you are eating between noon and 8 p.m. from the reasons of…or from the standpoint of starting your clock.

I guess we've kind of…now we've kind of gotten off on tangents but to bring that back, we have this clock and it's super-important, and so getting good light exposure—I'm sure I'm not the first person to say this—getting good light exposure and then eating kind of in harmony with that light exposure, so putting most of your food, I mean, from a practical sense, just eating most of your food when it's light out I think is very sound advice. Now, there are exceptions, but it's very important to keep those in sync.

And I guess just to give a couple of examples of what changes, so your liver during the daytime, it's really set up to favor storing carbohydrate, for example, and then at nighttime it's set up to make carbohydrate because your liver is what's responsible for keeping your blood sugar elevated while you sleep. Also, like metabolizing digestive enzymes, metabolizing…absorbing nutrients, all these things, it doesn't occur in the same way throughout the day because, again, if you think from an evolutionary standpoint, there's some cost to doing business in your body, right? And so if we're normally sleeping and not eating at night, these enzymes that have some cost, they shouldn't be upregulated. They should be downregulated because we don't need them at night, right? So your body wants to stay in a nice daily rhythm but then we screw it up by having artificial light exposure at night and eating, going through a drive-through at 2 a.m. and all these things. Yeah, I guess we've been kind of…I guess I've been jumping all around, but does that kind of answer what supposed to be we're getting at?

Danny Lennon: Yeah. No, that's perfect, Jeff, and I think it just brings up—and this is kind of again a question that might be often a tangent but I know it's something that, again, is more where people might be trying to figure this out in their head for their own situation—if we're looking at the main benefit then to eating during these daylight times being to try and have this concordance between our central clock governed by light and dark cycles and then these peripheral clocks trained by, say, food intake, what do we do then in

the case of maybe someone who does, say, nightshift work who is sleeping throughout the day in a dark room and then gets up at night? Would they have…because essentially that's going to throw off maybe some degree their circadian rhythms and people will talk about the inherent negative health consequences of shift work for that reason, are they in the same boat or how does this even piece into that if it does at all?

Jeff Rothschild: Yeah, I mean, that's a great question and it comes up often because so many people do work night shifts. As far as I know, there's one really good animal study, or good in my opinion, and I don't know that there's direct…there's a similar human study yet but basically when they took animals, rats, that, well, as aside, rats, you know, rodents are on the opposite schedule so they normally eat at night, but when they created a rodent model of night shift the animals that were eating during their normal time—so I'll just put it in human terms for simplicity. Basically, if we take this data from the animal study and put it in human terms, if you have to work night shift, eat most of your food during the daytime still and eat basically as light as possible at night. If you could really fast at night, it would be ideal. Of course, again, I've talked to plenty of people that work night shifts and it's hard to tell someone when they're hungry in the middle of the night to fast, right?

Danny Lennon: Right.

Jeff Rothschild: But what I do tell people then is something more like a salad or something light and that wouldn't require a large insulin release. So I wouldn't recommend a steak at two or three in the morning or a giant pizza or something. So eating as light as possible at night, so again salads I think would be a pretty good choice because they could be filling and so on, and then eating…then before you go to bed when you get home or waking up, depending on if you sleep from let's say 9 a.m. till 3 p.m. or something, getting as much food in as you can before you go to work or early in the work shift.

Danny Lennon: Okay.

Jeff Rothschild: So basically, again, just trying to keep it…because also a lot of these people are working two or three nights in a row and then kind of normal for two or three nights or four, so that's another thing. But I guess to make a long story short, the best evidence I've seen would show that there is a benefit to keeping your food in the normal time even if you're working in the other time.

Danny Lennon: Okay, perfect. Yeah, that's actually a really good segue maybe into some more of the practical applications for this stuff. I mean, at this point we've discussed time-restricted feeding windows. We've discussed potentially the best time of day theoretically for this to happen. So what does that look like in practice and maybe how you've used, first of all, we'll look at maybe time-restricted feeding and then off that we can go into other types of fasting models if you want into how you as a practitioner actually apply this with different types of people and in what context?

Jeff Rothschild: Yeah. So time-restricted feeding windows, I think they're so…you know, it's kind of a real interest to me and what some of the…there's more and more human research coming out and what it seems is that people that normally eat in a very wide time window, let's 15 to 16 hours, meaning from the time they start eating till the time they stop, they can actually get some nice benefit from cutting that down to 10-ish hours, 9, 10, 11 hours. But a lot of people actually do naturally eat within a, let's say, 11-, 12-hour window or 13-hour window, and I haven't found there's so much benefit from these people crunching that down a few hours. Now, yeah, you could if you force them to have seven- or eight-hour windows, they might get some benefit but again, the practicality, I mean, a lot of people either like eating breakfast and/or eat dinner with their family or something, or with friends or going out, so I don't find it's as practical on a regular basis as I might have hoped for based on how promising some of the literature is.

But that being said, usually what I'll do is, so if someone wants to lose weight, I think this is a really good place to think, "Okay, some type of fasting." We've talked about five different methods of fasting and I'll usually explain these to people, and what I like about it again from a practical side is you don't have to count calories. Now, I know someone will argue that yes, calories still matter, and I'm not saying they don't, but if you implement these you can get a lot of good mileage from people without them counting calories, which often can be a bit of a disaster. Either they skip meals or they forget or they estimate completely wrong. I'm not saying they can't work but…

So from a simplicity standpoint, then I'll…it usually comes down to two things. It's either fast from dinner to dinner once or twice a week or…so it's kind of 5:2, but I could say you can take these 500 calories and divide them out through three small meals. And what I found is men tend to prefer to go, "Okay, I'll just go dinner to dinner and tough it out twice a week or once a week," and women tend to do better with these three small meals, the same amount of calories, maybe 400 to 500 calories, on these

two days a week but maybe it's like a hardboiled egg and then a Greek yogurt, like a small of piece chicken and some veggies and something else. And that seems pretty manageable, and I've had some really good success with that in both instances but it's interesting that that's…I always explain them, you know, I kind of give people and kind of figure out, "Okay, what sounds like it might work in your lifestyle considering this, that and this?" And that's kind of how it's played out more often than not.

Danny Lennon: Yeah, that actually makes total sense to me and it's interesting, I've actually…I think the point about people being able to do this for, say, decreasing body fat levels without having to count calories is a really important point because sure, calories still matter, but when we're looking at this from a very practical level, and this is actually borne out in most of the research I've seen on alternate day fasting, one of the cool things that comes up and correct me if I'm wrong here, Jeff, is that when you see people being able to eat ab libitum after that fast day when they have then their feast day so to speak the next day, while they will maybe eat slightly above "a normal day," they never will overeat by enough to compensate for the deficit they created the previous day through the fast. So they're not, say, overcompensating and wiping that out, so the net effect is that they're still going to have this…they're not essentially having the same amount of calories over the two days or they're not doubling up their calories on that feast day. And I think that failure to, say, recompensate for the calories they missed out on through the fast is a really important aspect and hence why they don't necessarily have to count calories and can still eat in a deficit. And just as one anecdote, I've actually had a male client essentially do that, have a 24-hour fast, sometimes extending to 30 hours but pretty much 24-hour fast once a week, and eating roughly around maintenance the rest of the week and was able to start gradually leaning out on that because over that week he was eating slightly less than usual, right?

Jeff Rothschild: Yeah.

Danny Lennon: So it's kind of cool how that stuff plays out in practice.

Jeff Rothschild: Yeah. No, absolutely, I completely agree and the research supports what you said as far as like you might overeat…and actually some studies even show—in obese people there's a recent one—that they don't even overeat, meaning that next meal or the next day. So yeah, you just skip a day and you're kind of back to maintenance and it really can work well. Now, it's not for everyone but it can work just beautifully in a lot of people.

Danny Lennon: Right. One thing I'd be interested to hear your opinion on, Jeff, because I've been talking to a few people about fasting recently, some other coaches, and kind of making…one of the points at least I've found is people that have gone on some sort of intermittent fasting protocol or used time-restricted feeding windows is not necessarily just the benefits they get at that immediate time point in terms of changes in body composition or health, it's also to some degree some skills that they learn from that as well in that they start to really get more clued into true hunger signals, really noticing when they're actually hungry, and also being able to realize, "Hey, when I do feel a bit of hunger, I can actually go longer and tough it out for a bit longer than I would have thought and actually, in fact, it starts to dissipate fairly quickly and it is kind of gone for a long period of time," and they kind of get away from this notion of they have to eat something as soon as there's this tiny bit of hunger. Is this something that you've kind of seen with a lot of your clients that you've used it with?

Jeff Rothschild: Yeah, yeah, absolutely. Yeah, that's…and actually it's one of the…you take pleasure in the small things. And there was one guy who when I first started working with him he would need to keep like almonds or something in the car because he couldn't go like a couple of hours without needing to eat. And this was someone who had a substantial amount he could lose, and then to be able to see him going for six, eight hours now sometimes without eating during the day is just…it's just really interesting to see that progression.

Danny Lennon: Mm-hmm.

Jeff Rothschild: I guess it just reminded me, something I guess I wanted to talk about is athletes, and I know most people listening to this show are probably involved with sports in some way. What I found is the 5:2 dieting is really effective. And this is certainly more your specialty with the weight cutting and the combat sports, but a couple of people I have worked with, you see these guys in the combat sports, when they're trying to lose weight they're just in this static calorie deficit, 1500 a day or whatever it is. But thinking about, and this works for non-athletes too, but thinking about the calories in terms of over the course of a week, so if someone needs 2000 calories a day it's really 14,000 calories at the end of the week. Now, if you do two days of 500 calories, the other five days it's going to be 2600 calories and still come out to the same 14,000, right?

Danny Lennon: Right.

Jeff Rothschild: So with athletes, well, combat sports or otherwise that are having hard days and easy days, feed them more on the days where they need to actually get real workouts in and you can restrict strategically, and I think that's underappreciated and underused at least from what I've seen.

Danny Lennon: Yeah, for sure. I'm a big fan of that even to, for some of those who maybe aren't going to go as far as fasting or dropping calories as low even as a starting point, nearly across the board at this stage for some of our weight-class athletes and people competing in powerlifting and Olympic weightlifting as well, and then of course our MMA fighters, we nearly always now will include a kind of three-tier system of a low-, moderate- and high-calorie day just to account for, like you said, the days where we want to prioritize training, and then we can take advantage of lower intakes on the days they don't necessarily need it. And it sounds intuitive but now always is done, but I think going that step further and using these strategic fasts is probably potentially an even better idea because for, number one, like you say, we can bump those calories up even further on those priority training days and…but one, and this I think really relates back to what we discussed on your previous appearance on the show, Jeff, around differences in glycogen availability and training and recovering in with low glycogen status of, have you kind of combined these fasts to coincide with days where when they do go through the fast it's through that maybe recovery window or like recovery session that you're trying to get some of those changes we discuss when talking about low glycogen availability?

Jeff Rothschild: Yeah, that's a good question and I guess I haven't explicitly done that, but it's certainly on my mind and when I'm kind of trying to navigate someone's week or their training plan for them. And yeah, you hit it, the glycogen availability, one—I think we may have talked about this last time but just because it's the only thing that I kind of see coming up—people assume that a fasted training session is going to…you know, all fasted training sessions are the same, but if you go to sleep, let's say you have a dinner with a lot of carbs and you've eaten a lot of carbs in a given day and so you go to sleep let's say with a full tank of glycogen in your muscles, the next morning, even if you're fasted, your muscles actually have a full tank of glycogen, right?

Danny Lennon: Right.

Jeff Rothschild: And so you're not going to get that same benefit of a low-glycogen training session and, well, I guess I don't have a specific point other than I

just want to mention that this doesn't…you know, your muscle glycogen only goes down when you use it really for exercise, right? So your liver glycogen may be low after an overnight fast, but when thinking about this and trying to implement it I think it's important to remember to consider not only the, you know, right before you work out but the several meals before that and kind of the whole context of these several days. Or, at the same time, if you want someone to have a "fasted workout" or a low-glycogen workout, you have to think of several meals ahead of time because if they're not exercising that muscle glycogen is going to more or less stay where it's at. I think one really interesting study when I was first looking into the fasting stuff that I found was the muscle glycogen levels were the same in this group after an overnight fast and after an 84-hour fast, assuming they weren't exercising.

Danny Lennon: Wow. Mm-hmm.

Jeff Rothschild: So that just cemented in my head, it's like, wow, this stuff, you're not getting the benefits of a low-glycogen training session just because you're fasted.

Danny Lennon: Right. Yeah, I think a lot of people really underestimate what it actually takes to deplete glycogen or even get it kind of low in that just not eating for a while isn't going to do the trick. And even people who do a typical…if they're going into the gym and lifting weights, even if they're doing a pretty decently hard session and probably at most from what I've seen from probably going to deplete muscle glycogen by somewhere between 20 to 40% as kind of an upper limit for those types of like lifting sessions. And so yeah, people are really kind of underestimating what that does and I really, really am glad you brought up the point that when we discuss whether it's the topic of fasted cardio, there's no one particular type; you have to consider the whole context around it. There's not just one inherent type of fasted cardio, one context. It depends on what the previous day or previous week's probably nutrition and training protocol has tied into there.

So with that, Jeff, when we're trying to kind of round this off just because we're coming close to time here, there's probably…to kind of summarize some of this stuff with practical take-home points and how to practically start implementing some of this stuff, for…really it's a two-part question that you can address separately if you wish and it's really, when we're thinking of practical stuff to go and weigh and potentially implement some sort of fasting protocol, what are the main things you want people to be

aware of, number one, if say they're an individual that is thinking of using this themselves – maybe that's for just general body composition, health; second, it could be if they're an athlete; and then the third type of group would be for maybe coaches whether that's performance nutritionists or elsewhere who are going to maybe think about using this within their practice with different types of people or athletes, what for those different types of would you recommend as the main things to bear in mind when it comes to all of this stuff and going and implementing it?

Jeff Rothschild: Yeah, I mean, it's a good question, a big question, but basically I would think, okay, here are three or four or even five ways of…different methods that fall under this umbrella of intermittent fasting like we talked about earlier. Now, okay, then I know, okay, here are my tools, now what's this person or, if it's for an individual themselves or if they're a coach, what's this person's lifestyle? If they're training, when do they train and what are their goals? And that again sounds kind of obvious but it needs to be considered because if someone, again, loves breakfast and they have to come home to eat dinner at seven with their family, time-restricted feeding windows are going to be, while possibly effective, not very practical. Then let's say it's okay, well, 5:2 two days a week they can really restrict, so do they prefer to do like three meals of like 125 or 150 calories or do they prefer just to go dinner to dinner? I mean, the ultimate simplicity which is kind of knucklehead guys that I've worked with, it's like just twice a week just go from stop eating after dinner and wait till dinner the next day, and it can't really get much more simpler.

Now, if the person is trying to fit some more high-level training, meaning high volume/high intensity, I would be more cautious certainly. Now, we mentioned with athletes there is a place of kind of high days and low days of eating, but I would definitely be cautious because it can increase the stress load in the stress bucket, right? So I would consider the total training volume and intensity. If someone's training for an ironman, I would be cautious. I think there can still be a place for some like low-glycogen training but, again, being very cautious.

So yeah, I guess to just briefly summarize that, it's think of the tools here and my four, five or six options of doing this fasting and then what works best in their lifestyle.

I guess briefly, I know we're getting close, but there then is the option for someone that likes the idea of fasting and think it's great but it's just not practical in their lifestyle, then there is the idea of like every quarter, every

three or four months, doing this longer fast, and if it's alright we can just talk briefly about like these five-day fasting mimicking diets.

Danny Lennon: Yeah, for sure.

Jeff Rothschild: So I've mentioned a few times Dr. Valter Longo, he's at USC doing a lot of just amazing work with longer-term fasting and cancer and aging and these things. So there is this company and I believe it's a nonprofit, and he set it up but I think he donates all of his shares of it to charity, I believe. They basically created a five-day boxed food diet. So you get a box for each day and it's like soups and some bars and it's low-calorie, low-protein, low-carbohydrate, but fairly high-satiety. So it's actually surprisingly satiating, so when you're fasting for five days it doesn't really…it's not terrible. It's not fun but it's actually highly tolerable. And that is something that then you could do, like I said, even every six months and it kind of, I don't know, I like to use the analogy of an oil change for your body, for your immune system. There are I think a lot of benefits. They're putting out more and more research in different disease areas, so MS and cancer and things. But that's something that, okay, I work out a lot or I'm maybe let's say a fitness instructor who's teaching or training someone or someone who just doesn't really feel like fasting can be appropriate for them but still wants, again, these long-term kind of immune system benefits and things, I think there is a good place for these kind of very rare but longer fasts.

Danny Lennon: Yeah, it's a really, really fascinating area and I know, like you said, a number of different researchers in different areas related to chronic disease states have started to look at this. I think the group of Boston have been looking at this in cancer research, for example. With this for that five-day fast maybe in the case that you did, what was the typical actual caloric intake that you were having on those days?

Jeff Rothschild: Yeah, the first day is about 1100 and then the next four days are like 750.

Danny Lennon: Okay.

Jeff Rothschild: But it's very nutrient-dense. They give you olives and it's kind of high in fat. So it actually slides you I think quite gracefully into a ketogenic diet.

Danny Lennon: Right. Mm-hmm.

Jeff Rothschild: And actually just, like I said, a brief note, they did a study where they compared that type of diet, it's actually a seven-day version of that in MS

patients followed by six months of a Mediterranean diet compared with a ketogenic diet, and this actually performed better than a ketogenic diet. Again, a seven-day fasting mimicking diet followed by a Mediterranean-style diet, so I think there's a lot of people. The reason I brought that up is because I'm sure a lot of people are thinking, “I’ll just do a ketogenic diet.” I think there are benefits that go beyond that because of the protein restriction and things like that.

Danny Lennon: Yeah, for sure. I think, yeah, that that's of course an important one. And just from your own anecdotal experience, practically speaking, how did that experience go of like as each of those days went by, were you starting to notice different things on each day and how did you actually feel day to day as that kind of five-day window went by?

Jeff Rothschild: Yeah, it was interesting, I kind of describe it as I had a kind of a low-level hunger throughout. At no point was I ever really starving or had hunger pains but…and I didn't exercise. I was kind of cautious and took it easy. I kind of…I didn't schedule too many things. I just wanted to kind of see what was happening. And I felt like I was functioning mentally just fine. There was maybe, on like the fourth day, there was probably three or four hours where I was not maybe so pleasant to be around but, generally speaking, I was able to function normally. And I've used it with probably eight people so far. I mean, it's a new product and actually you have to get it through a healthcare practitioner. So I've just been kind of using it where appropriate with people and no one’s really had a problem with it. It did reset my weight probably about four pounds down, it felt like, and I know that could be water or glycogen but it seemed like where I was waking up consistently for the time before that, then I kind of just…I feel like it reset me down just a little bit.

And I think there's, again, not to get too far into this tangent, but there is some evidence of it kind of shrinks your organs in a good way. So I think there's…that’s where I think there is benefit. Even for someone who does a fast or let's say time-restricted feeding windows on a regular basis, I think there really still is a place for these longer fasts periodically. If it's just water, if you can do it on water only, that's fine, but something like this because, like I said, after…you get a whole new set of benefits after a couple of days of fasting that you just won't get on a daily basis.

Danny Lennon: Yeah. And are there any considerations for going back then to normal feeding once, say, one of these longer fasts has finished? So when you're advising people, is there anything they need to be aware of or is it just

simply go back to eating normally or should they be kind of aware of changes going from such a low intake back up?

Jeff Rothschild: You know, the website or the company will say kind of easing gradually with soups. What I have had a few people do is actually transition into a ketogenic diet even just for a few days, someone… two or three people who wouldn't normally follow a ketogenic diet but because they were already effectively in ketosis, kind of as a experiment, we just put them on a ketogenic diet for, yeah, just two or three days until they had some event or somewhere that they were going to break out of it. I think I just kind of ate normally, and I do plan on doing it again in the near future. But yeah, your stomach probably shrinks a little bit and so you're full easier. You kind of have these visions of like having a giant steak or something but, you know, just ease into it just kind of naturally. I think at that point you should be able to listen to your body a little bit better maybe and whatever seems appealing. Soups are probably an obvious one, but I think whatever sounds appealing. But officially, we should probably recommend to ease into it with soups and light foods.

Danny Lennon: Right. Awesome. Jeff, where can people find you online and check out more of the stuff you're doing and get in contact with you, etc.?

Jeff Rothschild: Yeah, my website is a good place. It's EatSleep.Fit. So that's www.eatsleep.fit. Also, because there's been so much interest on my end and from other people, myself and Dan Pardi put together a course on fasting and how to implement it and covering some of what we talked about today and getting more into the research showing more specifically what's it effective for and how to put it into practical application. And so that's something that's not available yet, but if you go to dansplan.com hopefully—I'm sure a number of your listeners will be familiar with Dan Pardi, sleep expert, expert on a lot of things and an extremely smart guy. So I had a lot of fun putting together this course with him and it's actually going to be out soon, and again, just to allow someone to kind of work through it at a more gradual pace and understand these concepts, historical context of fasting and then again how to figure out which of the different methods might be most appropriate at a given time.

Danny Lennon: Yeah, perfect. I will link to all that in the show notes and, like you say, regular listeners will be familiar with Dan who's been on the show twice now, the last time mentioning actually some of those courses that are going to be available including your one, intermittent fasting, and then previously he's also discussed some stuff around circadian biology with

the light and dark cycles, which applies to a lot of the stuff we discussed today. So for anyone listening who hasn't checked out those episodes, you can go back and do so now. It will be very relevant to what was discussed today.

And with that, Jeff, I just want to say thank you so much again for giving up your time and for some more great information. I'm sure it'll kick up a lot of discussion amongst people and hopefully you can get a bit of question and answers from people going on and I'm sure they're going to look into more of your stuff to find out more information. So thanks so much, Jeff, for your time.

Jeff Rothschild: Yeah, thank you so much for having me.

Danny Lennon: My pleasure. I'll talk to you soon, man.

Jeff Rothschild: Alright. Buh-bye.

Danny Lennon: So that was the awesome Jeff Rothschild. If you enjoyed this discussion particularly the areas around circadian rhythms and circadian clocks, then I'd recommend going back and listening to Episode 38 I believe it was when Dan Pardi was first on the show in which we discussed everything around sleep, light and dark cycles, and then the regulation of circadian rhythms. I think a lot of that is very relevant to what Jeff discussed today and will tie in nicely if you haven't listened to that episode. So I believe it was Episode 38. Just search for Sigma Nutrition and Dan Pardi, and it was the first appearance he had on this podcast.

In the show notes to this episode, I'm going to link up to more of Jeff's work. I'll also link to some of those academic research papers related to this topic and also where you can find Jeff online if you do want to contact him and ask about anything in more detail. And at that show notes page, you'll also be able to get the full transcript to this episode and to all our other episodes for absolutely free just as a way of providing some extra value for those of you who prefer to be able to go back and read over some of this stuff. So that's at SigmaNutrition.com/episode154.

If you want to find me on social media, then either just search for Sigma Nutrition and Performance on Facebook—you'll probably be able to find my personal profile there somewhere as well—or follow me on Instagram at my handle, dannylennon_sigmanutrition.

And remember, for those of you interested in the Sigma Weight Cutting System for MMA and boxing, then details are over at SigmaNutrition.com/weightcut. And really, if you go to SigmaNutrition.com, you'll be able to find everything in the Menu tab at the top that relates to what we've got going on between the weight cutting system, our comprehensive one-to-one online coaching service, the podcast, articles, T-shirts, whatever you are interested in. It's all up on SigmaNutrition.com as well as the chance to be able to go and sign up for the weekly email, the Sigma Synopsis, where you can stay in contact with us. So all of that is at SigmaNutrition.com, so head over and check out what we've got going on.

And that brings this week's episode to a close. I really do hope you enjoyed the episode and got some new perspective and took something that you can maybe go and look at in more detail now. And if you did, I would be extremely grateful if you either share this on social media or go leave a review for the show on iTunes. It really helps and hopefully we can try and spread more of these good scientific discussions and get some more science-based information out there by sharing this and helping move the podcast forward. So thank you for everyone that continues to do that. Thank you for all of you for listening. It really does mean a great deal.

And I will talk to you in next week's episode where I'm going to be discussing the effects of sugar consumption on human metabolism and health with renowned researcher Dr. Kimber Stanhope from UC Davis. So that's next week. Hope you check it out and I will talk to you then.

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