Danny Lennon: Hello and welcome to Sigma Nutrition Radio, the podcast that brings you evidence-based discussions related to nutrition, performance and health. My name is Danny Lennon and you are listening to Episode 159 of the podcast.

And before we get into today's interview, I just want to make a quick announcement. For those of you who may be interested, the Sigma Weight Cutting System for MMA and boxing is now available. All the details are up on the website. If you just go to SigmaNutrition.com, you'll see a tab there that you can click for the weight cutting system or, if you go directly to SigmaNutrition.com/weightcut, you'll have all the details. Essentially, this is a full step-by-step system that includes a full manual with both practical application and the underlying science behind it all explained for you. You'll get resource pages of how to construct a diet, whether that's in a phase focused on just performance nutrition and recovery or if you're trying to manipulate body composition or then if it's the specific weight cutting protocol that we use in the week leading up to a fight for an athlete trying to make weight, what they do leading up in the days to make weight and then how to rehydrate and refuel before the competition. All of that is laid out for you. There is a customizer tool where you can enter in your own details or those of an athlete that you work with and it'll come up essentially some specific recommendations for that weight cut protocol that week. So all of that is there—it's all explained up on the website—so just go to SigmaNutrition.com/weightcut and you will find the details there.

On to today's episode, and I'm absolutely delighted to have Phil Graham back on the podcast this time to discuss some nutrition and training considerations for those with diabetes. So as some of you who are familiar with Phil's work will know, Phil is a type 1 diabetic but that has been not something that has stopped him from progressing in his training and body composition goals over the years. He's competed nationally and internationally in the field of bodybuilding with things like Junior Mr. Britain, Junior Mr. Universe, etc. He's a well-respected coach who has worked with a number of people both on their body composition goals and just general health to do with nutrition, and follows some really sound evidence-based recommendations to work with people. And really, Phil has been at the forefront of trying to promote ideas that are going to be useful to diabetics who are looking to perform well in the gym, who are looking to build muscle, who are looking to lose body fat and want to do so in the best manner possible. And he's created a phenomenal resource with his new book that's been out over the last couple of months, The Diabetic Muscle and Fitness Guide, really, really well-put-together, something that I've been able to read through and look at some really solid information in there. I think it's going to help a lot of people, so I wanted to get Phil on to discuss some of the kind of core topics that often come up in these discussions related to diabetes and how we should go about programming not only nutrition but then exercise recommendations, particularly those with lofty goals. So I think this is going to be of quite a lot of interest to many of you, whether you suffer with diabetes, whether someone close to you does or whether you're a dietitian, a doctor or a personal trainer who has someone that you work with who has this condition. So we'll discuss some application of both type 1 diabetes and type 2 diabetes.

So without further ado, let's get into this week's show. And remember, you can get the show notes to this episode over at SigmaNutrition.com/episode159. So let's get Phil on the line.

Hey Phil, welcome back to the show. How are you doing, my man?

Phil Graham: Danny, thank you very much for having me on.

Danny Lennon: The pleasure's all mine and this is going to be a very not only fascinating and interesting discussion on a topic but I think one that's very relevant to many people listening. As we've maybe discussed before, any time diabetes comes up someone either knows someone living with diabetes that's very close to them or, for any of our coaches and nutritionists and

dietitians listening, will be working very closely with someone to try and help them. And I know recently you've just launched The Diabetic Muscle and Fitness Guide which, having looked through the book, is really, really well done, so I just wanted to start off by saying, a great job on what you've done there.

Phil Graham: Thank you. Thank you.

Danny Lennon: And before I get into some specifics, just very briefly for anyone who maybe hasn't come across your work before, maybe give them a bit of an introduction to yourself. And then, on top of that, I wanted to maybe get an insight from you as to why you felt it was so important to go and write this book specifically and what the aim when you set out to do it, why did you have that drive to go and write this particular book.

Phil Graham: Yeah, sure. It's quite an interesting one. I mean, diabetes when most people hear of it, they feel threatened because of the implications on health and everything else that it brings. Now, I was diagnosed when I was 16. At the time, my lifestyle, my approach to diet and training, was minimal. I was overweight, I was inactive, I was eating all the wrong kinds of food and didn't really have any respect for health at all. I didn't even know what diabetes was. All I knew was there was a kid in the class we had and he was able to eat sweets whenever he wanted to. So that's all that I knew back then. And then I was hit with a number of complications of diabetes very early on from 16 and I was diagnosed pretty much quite quickly. I didn't live with it for a period of time with like not knowing. I had rapid weight loss. I had all the signs and symptoms of it and overnight I had to make a marked change in my lifestyle, and it was diabetes that was the driving force for me to go and investigate basically what was wrong with my body. So I went on to university, I became obsessed with health and fitness, and I remember just going into extensive study and self-experimentation with basically everything involving strength training, nutrition, fat loss, and everything like that.

When I was in university, I was competing in bodybuilding at the time and I was able to take my knowledge of physiology, of diabetes and nutrition, and really tailor that into my lifestyle, and I went on to compete in various international shows, Mr. Universe, Junior Mr. Britain, all of these shows, and I was always told that I would never be able to do that. So I was able to achieve very low levels of body fat, I was able to achieve high levels of muscle mass whilst living with a highly catabolic condition that makes fat loss actually very, very hard, and we'll get into that in due course.

But I lived with diabetes and I never really talked about it much because it was sort of my own personal circumstance and I didn't want to bring it up as an excuse in the weight room. I was training alongside a lot of other individuals that didn't have the condition and were all training and getting along and I didn't really feel it was necessary to bring it up. And over time, as people began to become familiar with me having diabetes, more and more people started to ask me about it and, in fact, one time when I was speaking over in one of the fitness exhibitions in Birmingham, Body Power Expo, I remember I came offstage and I had a queue of I think it was about 15 people, all that had diabetes—and I was just talking about a general nutrition topic at the time—and each and every one of them had a unique problem that I could relate to.

And that's when the penny dropped for me, when I realized that, “Right. Okay. Well, you've been spending your entire life since 16,” I'm 28 now, “learning about diabetes. You've been to university, you’ve studied it to an advanced level, you have lived with it, you've experimented with it, you've asked around—” I mean, when I was 18, 19, I can remember contacting endocrinologists, specialists, all across the world to try to get to the bottom of my condition. I was asking questions and, I mean, I became obsessed with everything there is to do with the human body and diabetes. Why? Because I had a profound passion for building muscle and just the whole bodybuilding thing and I knew diabetes was such a hurdle to that, and I wanted to be able to understand that I knew that if I could control it that I could achieve what I wanted to. So I picked up an awful lot of knowledge and experience and I continue to do so this day. Living with diabetes is an ongoing experiment and constant measuring, assessment and evaluation is absolutely critical.

And there are so many people that have diabetes that don’t realize controlling it is a choice, and in order to control it you need to educate yourself. You need to measure. You need to understand what is going on. When you understand how your body is reacting, especially to exercise, which we'll talk about in due course, you can deal with a condition better. And if you're not going to take that conscious choice to control it, then you have to bear in mind you're taking full responsibility for the complications and the increase in quality of living that it brings, and it can be a very destructive and uncomfortable disease to live with.

And like you said at the start, coaches, dietitians, are coaching more people with diabetes than ever before, both type 2 and type 1. And everybody listening will know someone with diabetes but they may not

truly understand what they have to go through on a day-to-day basis, both from a physiological perspective and a psychological perspective, because I can tell you now that living with the burden of having to manually check what your pancreas automatically does for most people would scare most people when you look at the actual work that is involved in controlling it. All the dynamic circumstances of life that influence blood glucose levels, hormones, different situations, foods, nutrition, exercise, sleep, stress, infections, illness, injury, all of these things can affect blood glucose control, which is the main factor that people with diabetes need to look at. So it's going to be a very interesting chat Dan and I'm really looking forward to sharing some stuff with you guys.

Danny Lennon: Yeah, for sure. I mean, just looking at all those different components that you just mentioned and how this can tie into considerations for either a diabetic or someone who's helping to manage that condition, there are so many areas I want to dive into. But just before we get into some of those, I think it's probably important we lay a bit of foundation for this conversation considering that people listening will probably have different levels of understanding of this condition. So when it comes to the underlying physiology of diabetes, both type 1 and type 2, what are some important aspects of that that people should be aware of that they should understand that'll help kind of base the rest of this conversation?

Phil Graham: Okay. Well, generally speaking, diabetes mellitus is basically a group of metabolic diseases characterized by hyperglycemia. Hyper means high, glycemia relates to glucose in the blood. So we see elevated levels of glucose in the blood, it cannot leave the bloodstream and go into the particular cells that it needs to and that's due to a number of reasons. We've got type 1 diabetes, which results from the pancreas failing to produce insulin, and insulin is that key hormone that is involved in transporting the glucose out of the bloodstream and into the body’s cells for use as energy. It's also involved in organizing other metabolic traffic like minerals and fats and proteins as well, but we'll not get into that. Type 2 diabetes is a condition of defective insulin signaling, so basically the insulin does not do its job as effectively and there can be various different reasons behind that, and it's very important to realize that when it comes to talking about diabetes that it's such a multifaceted issue that there are so many different elements involved that contribute to type 1 diabetes, contribute to type 2 diabetes, and we're still very much in the early years of understanding actually what is going on. There’s research coming out all the time and again, as you know, some of it conflicts, some of it

doesn’t. We're still trying to get to the bottom of a lot of things. But the reality is diabetes results from a deficit in insulin secretion, insulin action or both.

Danny Lennon: Yeah. Okay. To lead us into this conversation, I think perhaps what might sound like a very generic or a basic question I'm going to throw out, but I think it serves actually a really good purpose to give some context and set the scene here of essentially what we're trying to do. When it comes to the diet for someone with diabetes, what is the role of the diet? Or, if we set it up correctly, what should we be trying to achieve from setting up the diet in a certain way? What roles is it going to play for the diabetic patient?

Phil Graham: I mean, first of all, we need to consider the fact that diabetes is a condition of undernutrition, so especially type 1 diabetes, and I mean this can even be linked back to Greek times I think there was a famous…I can't pronounce his name correctly but he described the condition very well. It was, a famous Greek physician, and he described diabetes as intense thirst and melting down the flesh and limbs into urine. So basically the body isn't able to utilize nutrition as efficiently and effectively as it would in a normal body because of the these problems in transporting all this metabolic fuel – carbohydrates, fats, proteins, and minerals, and as a result of that the individual with diabetes tends to be deficient or have a much greater chance of deficiencies in certain minerals. When it comes to protein, we see increased levels of protein breakdown, reductions in protein synthesis. We see increased breakdown in body fat, ketone production. We then see problems with the storage of carbohydrate into glycogen. So we can see that the body can't really metabolize fuel and organize it as well. And as a result of that especially for the people listening when we look at that from a sports nutrition or exercise physiology perspective, the individual with diabetes cannot perform and recover to their best if their condition is not controlled due to the lack of production of insulin or the deficiency in its action. So it's very important to organize nutrition into the specific goals of the individual. Nutrition for a type 1 diabetic may be completely different to that of a type 2.

So if we take the standard type 2 diabetic, we can see that fat loss is usually a primary goal there. But again, there are exceptions to that. There are people with type 2 diabetes that have it from other specific reasons – environment, genetics, a whole host of things. Certain drugs and medications can cause insulin resistance. So it really depends on the context of the diabetes, but generally speaking in type 2, fat loss is a primary concern and energy balance and adherence comes into play there

massively. In type 1, looking at optimizing glucose control through the diet and also as well taking into account if the individual is [00:16:31] underweight or overweight. Again, those conditions need to be taken into account. Exercise, depending on the type of exercise they're performing and their exercise goals or body composition goals. The nutrition needs to be tailored effectively.

But generally speaking, glucose management and control is absolutely essential and in someone with type 1 diabetes, they lack the ability to automatically control blood glucose, so dietary intake and exercise are absolutely essential whenever it comes to helping manage it. And there are certain circumstances where exercise, for example, different types of exercise, need to be approached differently. Again, anaerobic exercise, aerobic exercise, the body's response to those different types of exercise and fuel utilization is different. So again, looking at tweaking the diet and also taking into account the medication that's used with diabetes, it all needs to be taken into account. So it's a very sort of generalized question to say, "How does the diet need to be in someone with diabetes?" It really depends on the end goal, but generally speaking looking at maintaining a healthy level of blood glucose is very, very, very important.

Danny Lennon: Yeah, well, that's essentially such an important point, right, that when we consider the kinds of diabetes, type 1 versus type 2, we're looking at essentially two completely different conditions, right, with their own different set of effects on the person, the main kind of not only symptoms they're going to have but then the issues that they're going to maybe come to a professional trying to get help with. And I think it probably just highlights that fact, right, that there are going to be so many different circumstances and issues that a person who falls under this general umbrella term "diabetic" may come to a professional and may present with these different issues and circumstances, right?

Phil Graham: There are so many different circumstances. I mean, I could be type 1, underweight, because I don't manage my blood glucose levels and my body's in a constant state of catabolism. I can't utilize any of my fuel effectively and I'm coming in underweight. The primary solution there would be to look at managing blood glucose control with medication to ensure that that fuel is put in the right place. If I'm overweight and I'm type 1 diabetic, I may be eating too much, I may be getting in too many calories, and a key factor for that may be the use of the injectable drug insulin. We know that insulin lowers blood glucose and it does exactly what it says in the textbook: whenever you take it, [blood glucose] lowers,

and if you take too much you have to take in extra calories to bring your blood glucose back up.

So you can see why it can be very disadvantageous for somebody that wants to lose body fat, because as somebody loses body fat activity increases, energy intake lowers and you're still taking a manually injected drug, and if you accidentally take one or two units more or you're accidentally a little bit more active than normal or you delay your dose because you're stuck in traffic, we can then run ourselves into hypoglycemia and as a result have to treated that. So whatever food is around at a particular time, the environment—environment is critical to diabetes, both type 1 and type 2, we'll talk about in a minute. But for example, if I take a hypoglycemia in my car and there's nothing but a chocolate bar or a Mars bar or a BLT sandwich to take my blood glucose back up and I'm on a calorie-restricted diet, you can see sometimes how it can be very frustrating and it's a constant juggle to really fine-tune calorie intake to the needs of fat loss. So it takes absolute precision and not many people living with diabetes are willing to put the time, effort and money and nor have the education to be able to know how to react to certain circumstances.

Danny Lennon: Okay. One thing I wanted to bring up because I think it's important to talk about this because I'm sure lots of people will be having questions around this is when it comes to even outside of body composition, purely for nutrition to healthily manage the condition, there's obviously been huge talk and a lot of debate around the place both inside and outside of diabetic kind of community, so to speak, on the topic of using low-carbohydrate diets or even we could lump in ketogenic diets as well for mainly the same reasons to try and effectively manage the condition or potentially that would be a most optimal approach for someone with diabetes. And, I mean, within that we obviously have two ends of the extremes, right? We have people who will say that this is without doubt the default that all diabetics should be following, is something that's going to be a very-low-carbohydrate diet for that kind of reasoning that if you're not bringing in carbohydrates you're not increasing that need for insulin, etc., etc., and we can talk about some of the main arguments put forth for that reason. And at the opposite end of the spectrum, you have people pointing to, well, when you look at the main guidelines given out by a lot of, say, government bodies or diabetic groups or kind of I suppose mainstream dietetics, we're looking at regular consumption of carbohydrate-containing foods and matching an insulin amount to that. Again, that’s very

simplified and I don't want people to be jumping to think that that's what I think is out there, but that's a very simplified way of just thinking of these two extremes, I suppose, and then there's a lot of people in between. So, and I know this is opening a can of worms and can be very vague, but where do we start here on this topic? What should diabetics be aware of in your opinion when it comes to low-carbohydrate diets, to ketogenic diets, their potential role, or at least what they should be aware of when they start to think about these issues?

Phil Graham: First of all, Danny, it's very important to understand the implications of eating too low carbohydrate and the implications of eating too much carbohydrate, and again, this boils down to context. And whenever you are talking about low-carbohydrate dieting and diabetes management, you're primarily saying that from the perspective of the individual that does not participate in regular exercise. You're saying that from the average sedentary member of the public that has no intentions of building maximum amounts of muscle tissue or getting as lean as possible or performing to a very high level in sport.

So if we were to look at that from the listeners' perspective here, so people that are involved in sport, we need to look at the implications of consuming too little carbohydrate from a diabetic perspective, especially someone who is using insulin as an injectable drug. So if we look at type 1 diabetes, if we have too little carbohydrate in the system we have a dramatic increase in the risk of hypoglycemia, especially in those living with type 1 diabetes and that use injectable insulin. We potentially could see a decrease in training performance from that, also as well a reduction in muscle glycogen. And again, trying to juggle the whole ketogenic diet/ low-carbohydrate diet is pretty much impossible in someone with type 1 due to the use of the injectable drug insulin. It's so incredibly easy to over-administer that or to, as I say, get stuck in traffic or go for a period of time missing a meal and go hypoglycemia, and to get out of that we need to take carbohydrate. So it's a double-edged sword. Where do you go with that? So we need to really look at adherence as well, the fact that carbohydrate foods from an individual perspective may be tasty, nourishing, they may be a large part of somebody's diet from a cultural perspective, and eradicating those out might lead to some form of dietary restriction and poor levels of adherence. So we got to look at those kind of implications.

In somebody with type 2 diabetes, we could potentially argue that a lower-carbohydrate diet may be better due to the fact that increased levels of

protein and fat may be more satiating. And if we look at individuals that are particularly obese with type 2 diabetes we can see that predominantly, especially with a lot of the cases that I work with, that the food intake is primarily very high in carbohydrate, very low in protein, and ultra-high in fat. So the foods are ultra-palatable, they go down easy, and they're relatively high in calories.

Now, we also need to consider whenever it comes to people with diabetes that kidney issues can be a problem, so ultra-high intakes of protein can be a problem. So again, you can see there are a lot of intricacies here. But somebody with type 2 with healthy kidney function would be wise to potentially lower their carbohydrate intake, push their protein intake up just purely for appetite control and reduction in calorie intake and the promotion of an energy deficit, which is a key management factor in obese people with type 2. So that is definitely an important rule.

But whenever it comes to the benefits of low-carbohydrate dieting, we need to look at some of the proposed benefits. So obviously a reduced carbohydrate intake will reduce blood glucose and reduce the risk of hyperglycemia. So we know carbohydrate is one of those main macronutrients involved in increasing blood glucose and we know that blood glucose issues are a problem, especially hyperglycemia, in people with diabetes, so looking at eradicating or reducing that macronutrient may be of benefit. But again, what if you're weight training? What if you're exercising? What if your fuel intake is relatively high? We got to look at the context of…we also have to look, again, from the simple perspective that reducing carbohydrate is simply just reducing calories. So again, the type 2 perspective, that can be very beneficial. And then even without chasing weight loss, if we take carbohydrates out it still can promote an improvement in blood glucose. So type 2**,** type 1, elimination of carbohydrate means lower medication use because obviously we don’t need to take as much insulin to cover the carbohydrates, and if you live in countries, say, where you have to pay for your healthcare over time, prolonged periods of time, that can reduce medication costs.

But generally speaking, I'm a big advocator of carbohydrates in my diet or in anybody that is into regular or vigorous exercise. I enjoy carbohydrates. I get plenty of other nutrients, micronutrients from carbohydrate. It saves me from going into a very low level of blood glucose. It fuels my training performance, and from a bodybuilding perspective if you're into that kind of thing, from an aesthetic appearance perspective, carbohydrates are great

fuel for keeping muscle tissue nice and full and aesthetically pleasing, especially if you're lean.

So there are various different elements to that and what type of sport you compete in. Does that make sense? Because that's sort of coming from…covering a broad range of angles, but carbohydrates, it's got its protein-sparing effect as well especially in periods of calorie restriction. So there are a few other things and we know some of the metabolic advantages to including carbohydrate with refeeds and things like that, which may be of minimal significance in someone with diabetes that's just wanting to get lean, but there are a couple of things that we really need to consider before coming to a cold, hard yes/no.

Danny Lennon: Yeah. No, I think that's a perfect answer because it outlines perfectly why or at least what considerations people need to make. One thing that you did mention there, Phil, that I wanted to touch on was protein intake, and you obviously gave the context of for someone that has maybe preexisting kidney issues they may need to be a bit more moderate or go on the lower end of protein targets, but for those with healthy kidneys, they can probably have a sufficiently high amount of protein within the diet. One question that does tend to come up when people are discussing those with diabetes is when it comes to ingesting high-protein foods, is there any reason for the diabetic to be concerned about the potential insulinogenic response of certain high-protein foods for something like if they have whey protein, for example, or some lean beef on its own? Is there any reason why that should be an issue or is that a misplaced concern?

Phil Graham: Yeah. Well, I mean, it all boils down to the perspective of controlling blood glucose levels, and different types of food, it doesn’t matter if it's carbohydrate or protein, these are the two main types of foods that will influence blood glucose; dietary fat, not so much unless your diet’s very, very high in trans fats but, again, in Ireland and Europe we tend not to have as much of that, more so in the US. Whenever you look at carbohydrate/protein intake alone, different sources of food will have different effects on blood glucose and it all depends on what they're mixed with, how they're cooked, how they're prepared.

Now, when you talk about protein, the likes of whey protein for example, again, we have to look at this from the perspective of a type 1 and a type 2. So I'll look at it from the perspective of a type 1, somebody that produces no insulin. If you have no insulin presence and you were to take a whey protein shake or an isolate shake or a protein supplement that was

particularly high in leucine, you would tend to see a rapid increase in blood glucose. If you were to utilize foods such as beef, egg whites also as well, and again, this is also tying in personal experience with what some of the research says as well, these will increase your blood glucose levels.

And what you tend to find in people with diabetes is, especially those that have maybe gone in and read a little bit and tried to educate themselves, and this is a big mistake that I made, was I assumed that protein didn't have much of an effect on blood glucose compared to carbohydrate. What we tend to see is people only account for carbohydrate intake and they only inject or they only administer medication for that. The reality is there are so many different types of meat and protein that will increase blood glucose too and if you don't account for them via measurement, via weighing your food, looking at how your blood glucose responds 45 minutes later after a meal, looking to see whether you're hyperglycemic or hypoglycemic, depending on what you've injected, you can't really boil down to a conclusion as to how much you need to take for particular proteins. But without a shadow of a doubt, protein intake depending on the source, various different types, will affect blood glucose and needs to be accounted for in a diabetes dietary management strategy, 100%, and whey protein in particular will spike blood glucose levels relatively quickly.

Danny Lennon: Perfect. Thanks for that, Phil. One other thing I did want to pull back on when you mentioned around some of the issues that can come up, for example, that there can be a decreased rate of muscle protein synthesis or increased muscle protein breakdown, and then also if we look at that as a general concern for some diabetics who maybe are underweight or trying to gain weight, specifically muscle mass, when someone in that situation comes to you asking for advice on gaining muscle, are there any kind of common reasons that you see as to why they haven't been able to gain weight to this point or have been unsuccessful or feel that they find it impossible to gain muscle?

Phil Graham: Yeah, well, let's look at it from a very simple perspective. Okay, we've got hyperglycemia, so all that metabolic traffic can't out of the bloodstream and into the cells. So whenever we're hyperglycemic—again, I'm going to talk about this in a practical way but also to try and tie in the physiology as well—one, we see a dramatic increase in the potential for dehydration. Two, we see a reduction in mental clarity, cognitive function. We also see that with prolonged levels of hyperglycemia leads to increased levels of glycation and we can glycation and we can see stiffness in the joints and problems with mobility. So if we're looking at these particular elements

even from that perspective, from a training perspective, how can the individual with hyperglycemia get the full advantage from a training stimulus if they're not going in and they're concentrating poorly, they're slight dehydrated, their electrolyte balance is off, the muscle chemistry is off. And then we also take into account, depending on the severity of hyperglycemia and the length of hyperglycemia, we see an increase in protein breakdown and a decrease in protein synthesis. So it's not really an ideal environment for building muscle, especially when we're going in and trying to break it down. So from a recovery standpoint and a performance standpoint, a poorly controlled diabetic is absolutely shot.

I always used to get told whenever I was bodybuilding, “Oh, you're only good at bodybuilding because you take insulin. You're only good at bodybuilding…” and people were ignorantly assuming that the use of injectable insulin was an energetic aid. The reality is that that's not even the case in people without diabetes. I mean, it doesn’t lead to an increase in muscle mass. It just gives you a muscular pump and facilitates the transportation of nutrients. But from a diabetic perspective, I had a highly catabolic condition that the very minute my blood glucose levels slipped out of control my performance declined, my body started breaking down protein, and I was at increased risk of storing body fat due to the fact that sometimes I accidentally over-injected insulin.

So you can see all these battles that had to be faced whenever trying to optimize performance and that's not just from a bodybuilding perspective. I mean, since writing the book I've been contacted by various professional athletes all over the world, even a sprinter that was in the Olympics just recently and he was saying about how important the blood glucose control is and maximizing his performance in recovery, and there's so much stuff that goes on with blood glucose regulation and the body’s response that can develop an adaptation. So if you're taking hypoglycemia all the time, it can have a massive effect on your central nervous system. And we got a condition called hypoglycemia on awareness, so the more hypos you take the more unaware your body can become of actually sensing that, and that's due to effects in the nervous system that are responsible for that. And as a result you can drive yourself lower and lower and lower without knowing it, then go for a trip, drive home from the gym and drive the car off the road because your blood glucose levels are that low. And for anyone that has diabetes or knows someone with diabetes will know how debilitating hypoglycemia is and hyperglycemia.

The way I always used to describe—people used to ask me, “How does hyperglycemia feel?” And again, if you can understand this from a training perspective and the ability to gain muscle mass, but if I have a hyperglycemia, imagine how you feel after a Christmas dinner or Thanksgiving, that stuffed feeling, that sleepy, dozy kind of relaxed state. If you can imagine that and amplify it by maybe five to 10, obviously the higher you are the more amplified that will be. How do you think training performance is going to be when you feel like that and you're going in for a max lift?

So you have to really have a thick skin to be able to react and deal with fluctuations in blood glucose and it's…I say it every day in work with people: “Be ultra-vigilant and paranoid of your blood glucose levels.” Again, it's impossible to get precise control every single day because our day-to-day situations and activity change, but do your best, and if you don’t approach that with your best intention and effort your ability to get the most out of exercise is going to be problematic. And we can talk about the different effects of different types of exercise on blood glucose because they're relatively extreme and, again, exercise, as much of a benefit to diabetes, it can also be a massive hindrance as well especially when the individual doesn’t understand what’s happening.

Danny Lennon: That's actually a really good segue into that discussion because I think it's a particularly important point, especially when we not only are talking about the importance of exercise but also just the vast amount of people that really want to be involved within athletic endeavors or of high sporting goals, and we obviously have great examples of where they can fully succeed in that. So for people involved in different forms of exercise, what are the things that we need to be aware of of how they can influence their condition or what are the main things to consider with different forms of exercise?

Phil Graham: Well, first of all, we need to consider the fact that exercise is beneficial to the body in various different ways despite blood glucose control. So even if blood glucose control is bad, it can still be very beneficial, and we need to look at it from the perspective of all the physiological adaptations that typically occur with exercise, increase in energy expenditure, a whole host of things. But, when it comes to diabetes especially, we've got high-intensity training and low-intensity training. I'll just break it down like that, anaerobic, aerobic. And what we tend to see in anaerobic exercise—weight training, high-intensity interval training—we tend to see that the sympathetic response from the nervous system, so all the increase in

catecholamines, stress hormones, etc., etc., increases the output of glucose from the liver, and someone with type 1 diabetes who doesn't manufacture or produce their own insulin, we then tend to see the blood glucose levels rise as a result of that activity without the ingestion of carbohydrates. So you can understand from a diabetic perspective why it can be so confusing whenever you go into the gym and you realize, "I haven't taken any carbohydrate but my blood glucose level is up. I don't understand this. This is very frustrating."

And that's something that people with diabetes are struggling with immensely, especially young males, young females. "Why is my blood glucose level so high when I come out of the gym? I haven't eaten anything." And the reality is they need to understand the basic exercise physiology that different types of training bring about. So whenever we look at aerobic exercise, we tend to see a reduction in blood glucose levels, and again, that sympathetic response from the nervous system is nowhere near as extreme as it would be for high-intensity interval training or weight training. So there's a dramatic difference in the ability for the body to utilize different fuel sources. Now, don't get me wrong. We don't always exclusively use one entire energy system. But when you look on average at the type of fuel system that's being used within the particular exercise type, it's usually predominantly anaerobic or aerobic and over time that's what contributes to the end result.

So these are things to be aware of. Aerobic exercise, you're more than likely to go hypoglycemia if you're type 1. Anaerobic, you're more than likely to go hyper- if you're type 1. Now, from a type 2 perspective, they still produce insulin although ineffective or inefficient. Again, with that, I mean, weight training/strength training is probably one of the best activities that you could do not only from its ability to burn energy but its ability to increase muscle mass. And when we look at the capacity and the actual role of muscle mass, which is basically a storage house or vacuum for glucose that works nicely and independently without insulin it's contracted to help metabolize glucose more effectively, it's a very effective form of exercise in those individuals if they can do it.

But again, people with type 2 diabetes have potential added implications of obesity, blood pressure. Again, with diabetes, we also see things like limb amputation, complications in circulation. So loaded training with the feet for farmer's walk, for example, or isometric holds for example, these can all be problematic, we also see. Like, again, it all depends on the

severity of the complications that have resulted from their poor control over time.

But for somebody that's just being newly diagnosed with type 2 that is overweight or obese, weight training in combination with aerobic training is a very effective strategy at controlling blood glucose levels. Somebody with type 2, again, both are incredibly valuable, but without that insulin there it's still very important to ensure that your medication covers your blood glucose levels. So, I mean, there's loads of different ways to take this but, yeah, that's pretty much it on that.

Danny Lennon: Perfect. No, I think that gives us a really good idea of where we should…or at least things for people to be aware of, and I think that's the biggest thing to get across, right? Once you have an awareness of these things, you can then put in place strategies to manage that.

I just wanted to touch on one other typical question that often comes up for people that are trying to maybe manage this or help someone manage it, is around alcohol consumption because, I mean, everyone knows regardless of who we are that there's always going to be some degree of a tradeoff with someone's body composition goals, their performance, their health, once consumption goes beyond a certain point. But within reason, there's that kind of like middle ground of where it can still be included in someone's diet without really too much detriment overall. But then when it comes to diabetes specifically, are there any special considerations that you think people should be aware of when it comes to going out and drinking and how to include that in their lifestyle in a healthy manner?

Phil Graham: Yeah, well there's, I mean, a couple of things. Again, I'm going to link this to the context of the listener who's maybe into strength training. But first things first, if you're going out for a night of drinking, first of all we need to look at your overall energy intake, so whether you're in a period of mass gain or fat loss. If you're in a period of fat loss and you're in an energy deficit and your activity's high and your exercise regime is relatively active, you'd have the potential for alcohol to hit your system a little bit quicker, and alcohol from a diabetic perspective will lower your blood glucose. So again, if you've had minimal calories all day and you've maybe banked them up for an evening and you're going to consume a large proportion of them from alcohol or you've recently strength-trained right before you go out on a night out and your calories are low, there's a very high chance that your blood glucose levels will go into a hypoglycemic state especially with type 1.

And we also need to consider as well the type of drink that you're consuming. So this is a typical recommendation for most people, is to go out and have gin or vodka and a diet drink or something like that because they're lower in calories. Well, I'm actually quite against that to be honest because with those kinds of drinks, although they're low in calories, they get you drunk quicker. When you get drunk quicker, your awareness goes down, and with that food choice goes up and with that activity and behavior. The increase in—I think we can all relate to this—the increase in dangerous activity increases dramatically with alcohol consumption. You're laughing right now. So all of these things are putting the individual at risk.

So somebody with type 1 diabetes or that drinks into excess then behaves differently, then goes out of the nightclub at the end of the night and the only place that is open is a kebab shop and there's maybe a queue of 30 people to get a kebab, and that individual's got a low blood glucose and he goes to say to someone, "I don't feel well," "Oh, you're just drunk." So what happens in that lag period before that individual gets to the kebab shop? And even when they get the kebab, it's just a pita bread that's only about 20 grams of carbs but blood glucose level might be plummeting as a result of alcohol intake, as a result of the accidental administration of insulin because you were drunk, never mind all the dancing about you've been doing.

So diabetics can really put themselves in dangerous positions, especially those in type 1 and those taking injectable medication. And it's also important to be mindful that some type 2's can take injectable insulin as a form of treatment—that's usually in the very advanced stages of type 2—to basically just give the pancreas a break and facilitate some exogenous insulin administration. So, I mean, definitely you need to consider what you're drinking, what you've done beforehand, total calorie intake, preventative measures, ensuring that you have—I bring a packet of Mentos because they fit perfectly into my pocket and, well, they're solid, they don't melt. The typical treatment for individuals with diabetes was usually take a chocolate bar. The reality is that the glucose didn't hit the system in time and the individual's taking on far too many calories by consuming multiple chocolate bars until blood glucose levels comes back up. So, you know, fruity Mentos are my go-to. I like the minty ones but interchange them. Yeah, I mean those are very important things.

Danny Lennon: Great. Phil, this has been a really, really fascinating discussion, I think lots of valuable information for people I know they're really going to value and

get a lot from. So before I get to the very final question, can you maybe let people know where they can find more of your work online, where they can contact you, and maybe a bit around the book if they are interested in delving into this topic in way more detail?

Phil Graham: Yeah, sure. My main website is phil-graham.com for all my general fitness stuff but for anything diabetic-specific I have created a website, diabeticmuscleandfitness.com. The website is currently being fleshed out with content as we speak. As Danny has mentioned, I have produced probably the first if not only muscle-building body composition guide for people with diabetes. It's an incredibly in-depth text. It's 370 pages plus only-online content that comes along with it. It's loaded front to back with personal experience, evidence-based recommendations**,** everything that I've said. We look at everything from psychology, physiology, pathology of diabetes, exercise physiology, nutrition, supplementation, basically a wealth of information. The book weighs just over a kilo, so there's a lot of content in it.

The website, diabetesmuscleandfitness.com, I'm fleshing that out with articles, also what I would consider diabetic legends or people that are involved in professional sport or that have achieved very good levels of success in their particular field, and we did case studies and we interviewed them about their life with diabetes, and the site will be a membership site for people living with diabetes. I want it to be the world's biggest community for strength training, body composition, exclusively for people with diabetes, and the content that is going to be regularly updated on that is going to be very up-to-date – nutrition training, health mindset, psychology. We're going to have experts from all around the globe and various different expertise linking into that and contributing and really looking to add a lot of value and take away a lot of confusion, a lot of self-doubt, and basically bear hope to a lot of people with diabetes because it's such a minefield to try and find good-quality information about exercise and diabetes is very hard. Most people that talk about it don't have diabetes and can't relate to the condition and the psychology of it. Most people don't have the experience of training or partaking in sport to a high level. So we've got all these different elements combined and it really is going to help a lot of people.

And as I said to you offline, the book is now going all around the world. When you're receiving Instagram messages of people reading it in Bangladesh, it's a little bit weird when it came from my bedroom in Lisburn [Norther Ireland]. So yeah, it's all good and I really genuinely

want to help a lot of people with diabetes and it's my way of giving back. So, yeah.

Danny Lennon: Yeah. And as I said to you, Phil, the content is extremely high-level and I think it's going to help a lot of people, so I do of course highly recommend it. And for anyone listening, anything Phil just mentioned, the links will be listed in the show notes to this episode so you can click through to all of that stuff and find what Phil's going on and get more of that content.

Phil, I thought a good way to round up this episode would be a question that is related to something that we've kind of just briefly touched on a bit earlier or you've kind of mentioned fleetingly throughout this episode around the psychology related to living with diabetes, and I think this is particularly important to address from the perspective of maybe those listening who don't have the condition who are maybe working with those; maybe they're a nutritionist or a personal trainer or even just a friend that wants to help point them in the right direction to lead a healthier lifestyle. In terms of being a coach, I think one of the most important things is having the empathy to be able to understand people and to be able to work with them. So for those people, what do you think is the most important to try and understand about the psychology of this condition that maybe diabetics are going through that will be useful for those that are trying to help them?

Phil Graham: Yeah. Well, I mean, first of all, to be silently empathetic. I think being empathetic can be sort of patronizing to some individuals and, you know, being silently empathetic is very important, learning to listen as well. And also as a fitness professional or coach, if you are going to be working with people of this level, make sure you are qualified, make sure you are experienced, make sure you are very well-versed in what they're actually going through, and not just from an academic perspective but from an actual, practical, real-life perspective. It's alright reading about high blood glucose in a textbook, but linking that into an individual's life, how does it feel to have high blood glucose? When are you most likely to go high? How do you react? When do you feel high? These are very important things to know because whenever somebody has high blood glucose like I described it earlier on, people's behavior change, the mood changes, and mood fluctuations are something that are very common in people with diabetes. So again, learning to first of all ask why an individual is behaving in a particular way and looking at the underlying reasons as to possibly why.

And whenever you can relate to an individual better they will gain your trust better and they're more likely to follow through because, of all the individuals with diabetes that contact me that work with fitness professionals, coaches, dietitians, the first thing that they say is, “The doctors don’t have a clue. The dietitians don’t have a clue. My personal trainer doesn’t have a clue.” And that's telling me something that a lot of individuals, although they may be educated, they haven't actually seen what it's been like to live with the condition. And whenever an individual is stressed, a stressed mind makes bad choices and that could be with diet, training or other endeavors.

So it's very important to realize that textbook understanding is not all. You need to be able to actually relate to the diabetics. So source out a diabetic client. Listen to them. Listen to the day-to-day life. Get them to map it out. “What do you struggle with the most?” Find out those problems, find out those circumstances, and make them self-aware and use yourself as an accountability tool for them to relay information to you. Because, yes, while you may be able to teach them how to eat, you may be able to teach them how to exercise, they also need you to understand that, “Look, I wasn’t feeling too good for that training session. I wasn’t feeling up to it. My diet slipped and I went off track and I had a piece of chocolate cake because it was the only thing that I had.” Not reacting to that and, you know, again, being able to understand why things happen is very important as a coach and as a fitness professional, and your client’s duty of care is your utmost priority and it's up to you to be able to know the inside-out of that in order to get the best possible results for your clients.

Danny Lennon: Mm-hmm. Brilliant. I think that would be a massive help to a lot of people listening. And with that, Phil, I want to say thank you so much for not only your time today but for the great information and the continued great work you're doing helping people within this community both related to nutrition and coaching but then now specifically to those who are dealing with diabetes as well. Thank you so much for your time.

Phil Graham: And a massive thank you to Dan, and I know how much effort and time you put into these podcasts and you're really making a big impact with everything you're doing. Thank you.

Danny Lennon: And that wraps up our episode this week. That was Phil Graham. Remember, you can get all the show notes to this particular episode at SigmaNutrition.com/episode159. Also, if you go there, you'll be able to get a link to sign up to get the transcripts of this podcast free, delivered to

your inbox as a PDF each time one is available, and you'll also get access to all the previous episodes as well if you haven't subscribed.

Again, I just want to mention like at the outset of the show, those of you interested in performance nutrition for combat sport athletes, the Sigma Weight Cutting System for MMA and boxing is now up and available on the site, so please do go and check that out. And then for all of you regular listeners to the podcast, if you haven't had a chance yet or it's slipped your mind to leave a rating and review for the show on iTunes, I'd really, really appreciate if you did that. It helps so much to continue to promote the show and push it forwards and get more evidence-based information into people's hands, and it does make a huge difference and I just enjoy reading through all the reviews. I get to read every single one of them, so it makes a big difference. So thank you so much for that.

In the meantime I wanted to say, again, thank you for listening and we will be back next week with another episode.