

EPISODE 16: NUTRITION IN TYPE 1 DIABETES

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Today, we are pleased to welcome back Maureen Seel to talk about the role of nutrition in the management of type 1 diabetes. Welcome back, Maureen.

Maureen Seel, RDN/LDN, CDE: Thank you for having me. I'm glad to be here. I'm excited to talk with you guys.

RK: Well, thanks again for being back on our podcast. And today we wanted to focus really on nutrition in people with type 1 diabetes, which can be very different than nutrition and people with type 2 diabetes. So, I wonder if you could start off by talking about what makes it so different.

MS: I think in order to look at what makes nutrition or the approaches of nutrition for type 1 versus type 2 diabetes so different is the disease itself is so different. A lot of times [when] people think about diabetes, the first thing you think of is type 2 because it's the most common type of diabetes. Type 1 diabetes is an autoimmune disease. And I think about that as a self-allergy. For some reason, my body decided it didn't like those parts of my pancreas that make insulin, and now I can't make insulin anymore. And so how I think about nutrition for type 1 diabetes is now I have to take over for the pancreas. And what that means is usually [a] person with type 1 diabetes is either using injections or a pump to take insulin from an outside source because their body can't make it. And so now when I think about taking over for the pancreas, that means that I have to think about dosing that insulin. And with type 1 diabetes, a lot of times, weight loss and overall healthy diet is not as big of a focus as meeting correct doses of insulin. And so when it comes to nutrition and type 1 diabetes, we focus very hard on carbohydrates and how many grams of carbohydrates that person is eating so that we can manage their blood sugars and dose the insulin appropriately.

RK: And that's such an important point that you emphasized that really type 1 diabetes and type 2 diabetes are very different diseases. Even though they both revolve around high blood glucose, pathophysiology – the underlying reasons why those types of diabetes develop – are very different. And in type 1 diabetes, because patients are on insulin injections, usually multiple times per day, it does denote a different level of focusing on the carbohydrate content in the meal. So, I wonder if you could talk about what is carbohydrate counting and why is that important for a person with type 1 diabetes?

MS: So the reason that carbohydrate counting is important is because part of the insulin dose at a meal or at a snack is coming from how many grams of carbohydrates you eat. So there's something called an insulin-to-carbohydrate ratio. And this is basically saying how many grams of carbohydrate are covered by one unit of insulin and that number is different for

everybody. But the reason that the carbohydrate counting is important is that you take your total grams at that meal (however many grams you're going to eat) and divide it by whatever that ratio is so that we can dose the insulin appropriately. Counting carbohydrates is kind of the crux or the center of nutrition when it comes to type 1 diabetes . . . being able to be comfortable knowing how many grams I'm eating so that we can decide how much insulin you need for that amount of carbohydrate.

RK: And could you remind us again what carbohydrates are?

MS: Carbohydrate comes from several different foods and you can think about it as a food or a nutrient that when your body digests it and breaks it down, it turns into sugar. These foods are not necessarily bad foods. They come from a lot of healthy sources such as whole grains and fruits and vegetables. [Carbohydrates] can come from less healthy sources like sweets or anything with added sugar. [Carbohydrates] can come from many different sources but we still need to know the grams regardless of if you're having a soda or if you're having a bowl of fruit, just because again, it all comes down to insulin dosing and needing to know how much insulin you need for the food.

RK: So, like you said when the pancreas is working as it should, it can release a certain amount of insulin to cover the rise in blood glucose or the amount of carbohydrates we ingest. But when the pancreas isn't working as well as it should or at all, such as in type 1 diabetes, you kind of have to do the work for it, which takes some time to learn but after a while can become more routine. And for this reason, the carbohydrate counting that you mentioned is so important not only to give flexibility when you say for diet but also to ensure that the insulin matches to what you're eating. When we talk about the other components of the diet such as protein and fat, do we need to count those as well in type 1 diabetes or is it really just the carbohydrates?

MS: So we usually don't worry about counting protein and fat when it comes to diabetes, but we do want to take them into consideration because they can affect how your carbohydrates get into your bloodstream. A really good example for people with diabetes is pizza. It's kind of our nemesis. Our trouble food tends to be pizza or anything that has a large amount of fat and carbohydrates. And the reason for it is that protein and fat are digested more slowly. So, when we have a lot of those proteins and fats in a meal, they can get in the way of the carbohydrates and how quickly they get into your bloodstream. And to the point that it can actually affect how you dose your insulin if the food really does have a lot of protein or fat. So it's important to talk with either your dietician or your diabetes care team if you eat a lot of those foods or are noticing that they're causing problems with your blood sugars.

RK: So when foods do have a lot of protein and fat such as pizza and carbohydrate too, do you find that the glucose levels rise more slowly or faster in those cases?

MS: It tends to be more slow for a lot of people, especially with pizza or foods that are very high in fat. You'll see right after you eat the food especially if you're on a continuous glucose monitor – which I know is another topic for another day, but a lot of our type 1s will be familiar with the technology – you can watch what your blood sugars are doing right after. A lot of times, you're completely fine or steady. Some people even drop low right after they eat these

foods and then an hour, two, three [later]... depends on the person and how their digestion works, your blood sugar sometimes will shoot up really fast. I think about it as the carbohydrates are kind of on hold or on the back burner for a bit while your body is working on all that protein and fat. And then all of a sudden, that carbohydrate becomes available once the protein and fat are digested or mostly broken down and then you see that big rise in your blood sugars, which is usually what the problem is with people who have type 1. As you'll say, my sugar was fine at first, and now it's shot up and it's really high. And the reason again for that is just because of the delay and the rise of blood sugar because of the protein and fat.

RK: So it sounds like carbohydrates is really what is counted in people with type 1 diabetes. The amount of protein and fat in the meal can affect the absorption and the rise in the blood glucose and may require some adjustments on the insulin dose. Is that fair to say?

MS: Exactly.

RK: So zeroing in on the carbohydrate counting, how do you usually recommend to patients that they learn how to count carbohydrates? This is not something that comes intuitively. Clearly, there's nutrition labels for many things but for many things, there's not labeled when you're eating out or eating at a friend's house. So how do you usually start off counting carbohydrates?

MS: So the label is usually where people get started just because it is on a lot of foods. But there are a lot of apps that are available these days that you can download on your phone or websites that you can visit as well that will let you type in whatever food it is that you're looking for and then adjust the portion size and it will help you with estimating carbohydrates. One thing I do warn people about [is] that the apps will give you an estimate but a lot of times it's not exact. So you can never predict if this is going to be exactly the same slice of pizza as I get at my Mom and Pop restaurant that I go to on a Friday night but it's an educated guess and an educated guess is a lot better than not knowing at all.

RK: The resources are really great like the apps that we have these days. I know that there is this concept of one carb. Can you talk about what that is and how you can estimate one carb?

MS: So if you think about one carbohydrate as being one carbohydrate exchange, that is from the exchange method, we really don't use it that much anymore. But one carb or one carb serving is equal to 15 grams of carbohydrate. And again, it's a rough estimate. It's not exact. A good example is bread. Usually, a slice of sandwich bread – as long as it's not a ridiculously large loaf of sandwich bread – is roughly 15 grams of carbs. But when I say it's an estimate, I mean that when you go to the store and pick a few loaves of bread and look at the labels, some breads may be closer to 12 [grams], others might be 16-17 [grams] but somewhere in the middle is about 15 [grams]. And there are several different examples of a carb serving from different foods lists that are available online. But of course, you know, if you see a dietitian, we can go over with you what those servings would look like. It becomes more of an issue if you're trying to be very precise about your insulin dosing. Because like I said, for some people, if that slice of bread was 12 grams and you make a whole sandwich, that's 24 grams of carbs for your sandwich whereas if it was estimated to be 15 grams per slice, and you estimate 30 grams for that

sandwich, for some people who are very sensitive to insulin, that could cause you to go low... to just have, you know, dosed for too many carbohydrates. So, it can be helpful for when you're out and about and don't have a chance to get to a label or you know, you don't have your phone handy, you can't look something up. Being familiar with rough estimates of 15-ish grams of carbs for a serving of different foods could be really helpful just so that you can at least get a rough guess as to how many grams of carbs you're eating.

RK: But it sounds like, really, having those labels and those resources that can give you the exact amount of carbs is the preferred option. But when you don't, then having that rough rule of thumb of the carb exchange can be helpful.

MS: [It] can be for sure. And the reason we're a little picky with type 1 versus type 2 is more often than not, we're dosing insulin by matching, meaning that we're matching our insulin to our carbs that we eat. And so, the more precise that we are, the more we can hopefully avoid extreme high and low blood sugars.

RK: Is there usually a goal range that you recommend for carbs with each meal? Or is that really individualized?

MS: Highly individualized for type 1... it's only because when we do match insulin to what we eat, we're matching the amount of insulin to however many carbs you plan on eating. And that allows more freedom for people with type 1. A lot of times we treat type 1 as though you don't have diabetes. We're just again, taking over for the pancreas. So, we need to know is just how many grams you're going to eat regardless of if it's a steak dinner with a steak and a salad and no starch where you wouldn't need much carbs at all versus pasta night where you're planning on eating quite a bit of carbohydrates. All we're doing is adjusting that insulin dose to match what you plan on eating which allows for more flexibility in your meal planning and how you normally eat before you had diabetes.

RK: So, does this mean that patients can have large amount of carbohydrates if they're matching their insulin to what they're eating? Or what do you usually say to that?

MS: I usually tell people that carbs should be roughly 50% of the calories that you eat over the course of the day. Remember that carbs are our body's preferred source of fuel. Our brain likes sugar. It runs off of sugar so we don't want to cut carbs out. However, if I have a patient who's coming in and eating large bowls of pasta every single dinner, that's not really good for anybody <chuckles>. So, I say that there is a limit to this rule about you know how many carbs you eat. I usually don't like to see people go too far over 80 grams at each meal. But right now, I work in pediatrics, and we'll say that kids, you know, especially like teenagers, might need more than that. As a general rule, [I advise] roughly 50% of your calories coming from carbs and you can kind of distribute those throughout the day as you'd like to depending on how you normally eat.

RK: On the opposite end of the spectrum and sometimes I see this with my patients, they'll tell me they have very little carbs with some of their meals. Is that okay? Or do you usually recommend a minimum amount of carbs with each meal?

MS: I usually don't like to see anybody going much further than 40% of their calories coming from carbs. The ketogenic diet is very popular with a lot of people with diabetes, regardless of if it's type 1 or type 2, because you're not eating as many carbohydrates and so you're not seeing as much variability in your blood sugars. What can become a problem with very low carb diets or lower carb diets is it limits your choices. And so, a lot of times people will become frustrated that some of their favorite foods are higher in carbs and then they can't eat them. It can be very difficult diet to follow in the long run. It's not as sustainable as just trying to do balance variety and moderation.

RK: You know, the idea of carbohydrate counting sounds like it could be pretty complicated. And I know that I have patients in my practice who prefer not to carbohydrate count and to do what we call a fixed-dose method. And I wonder if you could talk a little bit about the options for someone who doesn't want to do carbohydrate counting. And how difficult really is it to learn carbohydrate counting? Maybe it's not as difficult as it might seem at first.

MS: It's overwhelming I think more than it is complicated... at first. Because counting actual carbohydrates, if you're using the technology that's available or a label if it's in front of you, it does involve some math. But the actual idea of counting grams is not that difficult, but it can be frustrating. And what I mean by that is if I use an app that is user-driven, that means anyone can add information to this app, so I could look up a food to get carbohydrate information and maybe it's not complete because that person only included calorie information. So now, I can't use that food for my carb counting, I have to look up another food. So it's not necessarily difficult to use that app for this example. But other people haven't put information in there and so you have to look up multiple options. Practice makes perfect with carb counting. It gets easier the more that you do it. I'm to the point now and I'm okay disclosing that I have type 1 diabetes. I have had type 1 diabetes for 22 years. But the more you do it, the more I count my carbs, I'm able to look at a plate these days and estimate how many grams of carbs in the meal without having to take out my phone. And for the most part, it has been fairly accurate but it's one of those things that the more you do it, the easier it gets.

When it comes to fixed meal dosing, how I usually approach that with my patients is [to] get a picture of how their normal day looks – how many carbs they usually eat at each meal. I usually sit down with them and talk about, “What is a normal breakfast for you?” or “Give me a few examples of a normal breakfast for you.” And then I work with the provider to decide what those fixed doses might look like depending on what foods they eat. So it could be we decide you need this many units at breakfast because you normally eat this many carbs. And so, it can be done, for sure. The dosing may not be quite as accurate depending on if you maybe aren't estimating your portions quite as well, you could be eating more or less grams and so that dose may not match quite as well as when you actually count grams of carbs. But it certainly can be done.

RK: Well, it's great to hear that there's options that carbohydrate counting, as you described, really maximizes the flexibility because it allows you to eat more or less carbs with each meal and match the amount of insulin you take to what you're eating, the carbohydrates, in particular. But for those that might not feel as comfortable just yet, or really want to do something that's a bit more straightforward and have regular meals with regular carbohydrate

content, this idea of a fixed dose or the same dose of insulin with each meal might be an option. But it really takes teamwork, doesn't it... working with patients and providers together to find the best options.

MS: Yep. I always tell the patient that, "The patient is the most important member of the care team." Because, you know, we give you information when you're here in the office with us and we talk to you, but you're the one who takes it home every day, you're the person who wakes up with it every day. And so we want to do our best to help you live a healthier life and give you what you need to be able to feel like you can manage it on your own.

RK: For sure. I fully agree with that. And patient-centered care is definitely a focus for everything that we do. So once a patient feels comfortable with carbohydrate counting, and you've talked with them and they seem familiar, what's usually the next step then of incorporating that into insulin dosing in their regimen?

MS: So like I mentioned earlier, with the insulin-to-carbohydrate ratio, your doctor and your tight team decide for you how many grams of carbs are covered by a unit of insulin. So the next step if you're sitting down to your breakfast, let's say, you would look at each item that you have in front of you and then identify where are my carbs. So we'll walk through a little example of... let's say this person is having some eggs and some ham and hashbrowns and maybe they're having a piece of fruit. So you would sit down and look at your meal and say, "Okay, the eggs and the ham [have] no carbs but those hashbrowns and that piece of fruit definitely have carbs." So once you identify your carbs, you look at how much of that food you have: so how many hash browns or how much hash browns do I have? How big is this piece of fruit? Let's say it's a banana. And then once you know that information, you can either look it up, if you have a label, you can use the label to look at the serving size and then you add together your grams. Once you know how many grams of carbs is in front of you, you can divide those grams by your ratio. So for example, we'll say this person has 65 grams of carbs at their meal, and their carbohydrate ratio is 10 grams. So you would divide that 65 grams by 10. And that will give you your dose for the food.

RK: I really liked the way that you described that step-by-step and just kind of just dissect it further. So after coming up with the total amount of 65 grams of carbs and having a ratio, like you said, let's say one unit for every 10 grams of carbohydrate, just a little bit of mental math or using even what we call a bolus calculator if they're using an insulin pump or some other kind of app to help do that calculation, and then dividing the total amount of carbs by the ratio. So as you said, 65 divided by 10, which gives about 6.5 units. And [it] sounds I think more complicated than it is. And I think it becomes almost intuitive, doesn't it...after a while.

MS: It does after a while. And again, it's one of those things that the more you do it, the less you need to do it. I'm able to look at a bowl of cereal these days and be pretty close within a few grams of estimating just because I eat the same things a lot. And I do notice a lot of people, especially with type 1, tend to eat a lot of the same things because you know the carb counts and it makes it much easier.

RK: And you mentioned that the insulin-to-carbohydrate ratio is usually something that the healthcare team will discuss and decide together with the patient. Can you give examples of insulin-to-carb ratios that might indicate someone's more insulin-resistant versus insulin-sensitive, for instance? And what might be a usual starting insulin-to-carb ratio?

MS: A starting insulin-to-carb ratio is really determined by the patient's weight, a lot of the time their age, and then also how many units of insulin that seems like they need over the course of the day. So that number itself is very individualized but also it can change over time as well. As far as seeing if someone is insulin-resistant, what we would normally see is the person takes the dose that their doctor prescribed or that they've decided on and then after the meal, we might not see their blood sugars fluctuate much at all. Let's say they go into the meal with 200 mg/dL blood sugar and then two hours later their sugars are still high. To me, that would indicate that maybe they're not getting enough either carbohydrate insulin or the other part of the insulin dose which is correction, meaning my blood sugar is high, I need to correct it, [and] how much insulin do I need to bring my sugar down to target or to where my doctor wants to see my blood sugar. So if a person's blood sugar is not coming down after they eat, that to me says that either their carb ratio could be incorrect or maybe we need to give them more insulin for the carbs they eat or that their blood sugars aren't correctly being corrected; that they would need more insulin to bring down their blood sugar to the goal that their doctors and they have set.

RK: As you say, for someone who might be more insulin-resistant, perhaps they need, let's say, one unit for every five grams of carbohydrate versus someone who might be more sensitive to insulin, they don't need as much, maybe it's only one unit for every 30 grams of carbs. So actually, the higher the second number, the more sensitive the person is to insulin. And you mentioned that correction scale, which we haven't talked too much about, which is an additional component of kind of insulin dosing for a person with type 1 diabetes... I don't know if you want to talk any more about that. But with the mealtime insulin dosing, perhaps it's just fair to say that in addition to the amount of insulin calculated for the carbohydrates, often patients with type 1 diabetes additionally add insulin to account for the blood glucose before the meal.

MS: That is correct. And the idea is that if my blood sugar was completely fine, if it was in range, let's say it's 100, and I'm going into my meal, I might only need the insulin dose for the carbohydrates. If I'm eating a very low carb meal, let's say that steak and salad that I mentioned earlier, but my blood sugar is high, you might only need that correction part of the insulin dose. If you're going into a very low carb meal, but your blood sugar is in range, you might need no insulin or very little insulin at all.

RK: So it's important to both look at the blood glucose number, it sounds, like before the meal and also calculate the amount of carbohydrates you're eating to figure out the total mealtime dose.

MS: Exactly.

RK: Well, Maureen. Thanks so much for being here today again and this time focusing in on nutrition and type 1 diabetes. I wonder if you had any parting words for those with type 1 diabetes that are just embarking on carbohydrate counting. Any advice that you'd have for them?

MS: It is a lifelong disease. And, you know, I really don't like that word 'disease' because it feels so negative. But it is one of those things that you roll with the punches. You could learn something one day and it works perfectly and then do that exact same thing the next day and your blood sugar's might react entirely different. So just being willing to be open to watching what your numbers do and talking with your team will help you with managing those numbers a lot. Carbohydrate counting specifically – which is kind of the route of nutrition for type 1 diabetes – is also kind of a lifelong thing. There's new tools that are being developed all the time. Now we have apps where when I was first diagnosed, I had a book that I had to carry around with me all the time to have my carbs and the foods that I eat in it. So when as technology gets better and better, I think type 1 diabetes has gotten to be much more manageable than it used to be.

RK: Well, thanks so much, Maureen, for being here again and sharing all those recent developments that have made it easier for the management of type 1 diabetes and practical tips that you've offered on and how to make it easier day-to-day with carbohydrate counting. We really appreciate it.

MS: For sure. It's become much more livable than it used to be.

RK: I'm Dr. Rita Kalyani, and you've been listening to *Diabetes Deconstructed*, a companion podcast to the *Johns Hopkins Patient Guide to Diabetes* website which has all kinds of useful information about diabetes, including videos and animations a lifestyle and nutrition blog and a comprehensive diabetes glossary. For more information visit hopkinsdiabetesinfo.org.

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