

Diet Doctor Podcast with Jake Kushner (Episode 37)

Dr. Bret Scher: Welcome back to the Diet Doctor podcast with Dr. Bret Scher. Today I'm joined by Dr. Jake Kushner. Dr. Kushner is an MD and endocrinologist and he was the head of the pediatric diabetes and endocrinology section at Texas Children's Hospital and the Baylor College of Medicine. And he has extensive experience helping patients with type 1 diabetes.

Now a little definition and we're going to some of this in the talk, but type 1 diabetes is basically known as juvenile diabetes although is not always in kids but is more of the autoimmune condition when your pancreas doesn't make enough insulin. And these patients are absolutely dependent on having insulin shots and insulin infusions very different from type 2 diabetes which is what we're usually talking about.

Now Dr. Kushner in dealing with kids and adolescents and teenagers and families has learned not only the importance of treating people physically, but the emotional side of treating diabetes that comes with this and he's learned along with people like Dr. Bernstein and groups like the Typeonegrit that we talk about, how to use low-carb lifestyles and low-carb nutrition to help people not only physically but emotionally with the challenges of type 1 diabetes.

And it's really eye-opening and almost earth shattering because people would think that you need your carbohydrates when you have diabetes and you simply cover with insulin and that's been the paradigm for years. But this new way of seeing things is really paving the way for hopefully better healthcare and better experiences for people with diabetes.

So he has made a transition now where he's working for McNair Interest, which is a private equity group specifically looking for companies that they can help investing to help further the impact they can have on type 1 diabetes. Now he is still trying to keep his foot in clinical practice as well and I'm glad for that because clearly when you hear him, you can see how good he is at dealing with people and helping people.

But yet at the same time he's trying to help find the next big thing to help patients with type 1 diabetes. So I hope you enjoy his perspective and a lot of the lessons here to help someone that you me know with type 1 diabetes. As always we don't give medical advice, this is meant for general knowledge and hopefully knowledge that

you can then take to your physician or help someone find a physician who is more knowledgeable in these fields to see if it's something that they can use to help them. So without disclaimer, enjoy this interview with Dr. Jake Kushner.

Dr. Jake Kushner welcome to the Diet Doctor podcast.

Dr. Jake Kushner: Thanks so much. I'm happy to be here.

Bret: It's a pleasure to have you here today. I have heard you speak so much about type 1 diabetes and specifically a low carbohydrate approach to it and I have to be honest when I was first approached a couple of years ago about who I would not put on a low-carb diet, people with type 1 diabetes were the first people to pop into my mind, just because in my mind at the time they were sort of like this dangerous black box that we don't want to touch.

And then I learned more about Dr. Bernstein and I heard your talks and all of a sudden I had a complete 180. And it almost seemed like they were-- they then became almost a perfect person to trying on a low-carb diet. So you were very influential in helping me formulate my opinion on that. So first I want to say thank you with that but before we get more into that I want to learn more about you.

So what initially motivated you to get into endocrinology and specifically diabetes? Because I have to be honest I remember my pediatric diabetes rotation, and my memory is as it was a lot of cranky and moody teenagers that you had to sort of fight and argue with and it didn't seem like a lot of fun. But that was one perspective from many, many years ago. So give your perspective on what sort of got you into this field.

Jake: Okay so I was one of these people trying to decide between a career in medicine or a career in science. I decided to become a physician scientist. Oddly my vision of being a physician scientist was always to be a pediatric physician scientist. And I thought, you know, I love being around children, I love supporting them and maybe I could combine these two interests.

So that was going on from when I was maybe 13 or 14 years old. I was considering becoming a-- My parents were scientists and there were physicians also in my family including my great-grandfather and so I thought that it would be a very nice mix. So I didn't really understand endocrinology, what it was or what its potential was, but there was this rich tradition of studying endocrinology among scientists in the 70s and 80s.

And my parents were both postdoctoral research fellows at UCSF and so there were many great physician scientists there, including one of my dad's mentors, the late Dr. John Baxter.

So he was a pioneer in applying science to endocrinology. And there were many other physician scientists in endocrinology as a result of it. The thought was, you know, there are hormones, you could clone them, you could understand them, you could understand the regulation and you might be able to ultimately figure out ways to help people through molecular biology.

And so I was interested in these ideas and then the development of biology revolution came along. And so I wanted to learn about the development of biology and apply it to endocrinology. And so I went to Boston Children's with this idea, not really understanding that I would get involved in diabetes.

So I was a fellow in pediatric endocrinology there and I was caring for a variety of patients. Half of what we do in endocrinology is what I call esoterica endocrinologica. It's the rare, unusual, complicated disorder where someone's missing a particular hormone. But the other half of what we do was caring for kids with diabetes and I just saw those kids and those parents and I imagine myself in that situation and I thought that there is just tremendous unmet need.

And so it was clearly-- it was a calling for me in that there was a demand for something new, something novel. And so I began to follow the patients as a fellow in endocrinology, I became the primary endocrinologist. I was also almost like the diabetes nurse educator. I was the person who they called for school letters and prescriptions and I just got to know these families. And from that I just fell, you know, hopelessly into the world of diabetes and so that's really remained my professional identity ever since, since 1997.

Bret: That's fantastic. So you have been doing research and caring for patients ever since 1997.

Jake: That's right. Well, what happened was, as fellows in endocrinology, we had a two-year block of research. And so I went to work at the Joslin Diabetes Center, which is a famous place and I worked in a beta cell biology lab and then ultimately switched to an insulin signaling lab and stayed there as a postdoc for almost 5 1/2 years. So I established my research career and began apply for grants and then ultimately took a faculty position at U Penn in Philadelphia. And I began a career as a beta cell biologist, and turned to study the cells within the pancreas within the islets of Langerhans that make insulin.

Bret: Okay, so let's rewind for second and talk about type 1 diabetes, because we hear so much about type 2 diabetes. So type 1 diabetes being maybe like 5% of the population with diabetes... is that pretty accurate? Yeah, and with a very different pathophysiology. So tell us a little bit about what separates type 1 from type 2.

Jake: Okay, so type 2 diabetes is what we think of generically as diabetes, or what a lot of people think of as diabetes. And it's associated with being overweight and this metabolic insulin resistance and it is the incredibly common throughout the world. Type 1 diabetes is in some ways the more primordial form of diabetes and that-- before we were overweight or insulin resistant, many people or in some populations most people who got diabetes actually had type 1.

So traditionally skinny populations, these people would be healthy and cruising around living their lives and all of a sudden they would begin to get symptoms of uncontrolled diabetes such as thirst and frequent urination and if you were to check their blood glucose you'd discover that it's high and they have in some cases ketones in the urine and what's happening is it's an autoimmune condition.

So the B cells and the T cells attack the pancreas and ultimately generate an autoimmune response and remove the ability to make insulin. So these beta cells within the pancreas of the islets of Langerhans, those beta cells are preferentially lost in type 1 diabetes. It's largely a T cell disease though the B cells which make antibodies also contribute and over time people just completely lose their ability to make insulin. So insulin is life-sustaining for them.

Bret: Yeah, it's interesting, even though it's diabetes type 1 and type 2, it's almost like they are opposite diseases, with type 2 usually having involving too much insulin, hyperinsulinemia and insulin resistance, in type 1 in absence of insulin. So without insulin it's life-threatening. So how were these patients treated before we had insulin as a medication?

Jake: So there is something called-- there was a restrictive diet that was pioneered by Dr. Allen and essentially what they did was it was a small amount of calories and there were almost no carbohydrates, it was largely fat and protein. And so the idea was minimal as substrate and almost nothing that required insulin.

And some people have called it a starvation diet - that's not really true. They were essentially in nutritional ketosis. And if you found someone who was newly diagnosed with type 1 diabetes, say a teenager, and you placed them on this Allen diet, they might be able to live for several years. But they were very, very thin. But without that, they would waste away and died within months.

Bret: So without insulin as a medication it was a temporizing measure, but certainly better than the usual high carbohydrate diet. Then, it was a clear quick death sentence. But then insulin is discovered, insulin as a medication, which revolutionizes the treatment for type 1 diabetes. We talk about insulin in such a negative way but really it's been life-saving.

Jake: It's wonderful.

Bret: Yeah. But then what happened to the dietary treatment of diabetes. How did that change--?

Jake: So, this is complicated. Some of the best of what you can read about this comes from Dr. Elliott Joslin in Boston and he pioneered the use of insulin in people with type 1 diabetes in the United States. He had a type 1 diabetes specific clinic and he developed protocols to use this new reagent insulin in people with type 1. And what he discovered was it was very difficult to get blood sugars in the normal range. At the time they couldn't test blood sugar; they really just tested sugar in the urine.

But his goal was to try to figure out a way to get people under control and he studied people with type 1 diabetes for the first few decades following the discovery of insulin. And unfortunately during that time what we now know of as diabetes complications began to arise. So there's an amazing paper that describes retinitis, diabetic retinopathy and diabetic nephropathy--

Bret: So complications to the eyes and the kidneys from diabetes.

Jake: As well as heart disease and vascular disease and stroke. So there was this realization that if you replace the insulin, people are going to end up suffering these terrible complications. And then a big question arose as to how to minimize those complications. Joslin was a proponent of this idea of trying to get the blood sugars as close to normal as possible and he came about that perspective gradually following patients and thinking really deeply about diabetes.

There were other people who believed that diabetes complications were simply controlled by genetics and that they were random or stochastic. So there's an intense debate in the field about how to minimize complications. And in the field it was really divided into these two extreme camps.

Bret: It's interesting because now it just makes sense that of course you have to get the blood sugar down, so it's fascinating to know it wasn't always agreed-upon. And then the trial started happening and we started to get data to show that lower levels of blood glucose with hemoglobin A1c being a very common measure of sort of the three-month average of glucose, that the lower that was, the lower the risk of complications. But tell us a little bit about the difference between microvascular and macrovascular complications.

Jake: Okay so microvascular complications we think of as the things that happen around the eye and the kidney and also in the skin, in the nervous system... That is what's called diabetic gastroparesis--

Bret: So the stomach doesn't empty well.

Jake: Yeah, where the nerves in the stomach are altered and the stomach loses its ability to empty well. People can also get numbness and diabetic neuropathy and very painful pins and needles like sensations.

Bret: So those are the microvascular.

Jake: And then macrovascular is the big vessel disease. So macro/large vascular vessel - heart attack, stroke, and ultimately cardiovascular death is the most common end point for people with type 1 or type 2 diabetes. It's really the major scary thing that happens.

Bret: Now is there a difference though in being able to affect those outcomes with treating blood glucose to a certain level?

Jake: So this question was really the focus of a lot of diabetes doctors over the 60s and 70s and 80s and they lobbied for a clinical trial to try to figure this out. And that ultimately became something called the DCCT, the diabetes control and complication trial and is a pretty amazing study. What they did was they took people with type 1 diabetes who were fairly newly diagnosed.

So they took 1400 patients mostly adolescents and young adults and they randomized them either to the standard care of the day, which was typically one or in some cases two shots a day and just focused on support, comfort care, supporting people and helping them to feel good and advising them to regulate their meals so that they didn't eat too much of any particular carbohydrate. And then the other alternative was this very aggressive control of glucose. And at the time there was really no standard therapy to treat type 1 diabetes and get blood sugars down to near normal levels.

But what they did was they leveraged each of these centers and they had them contribute their ideas and weekly phone calls and they developed best practices. So each center tried things a little bit differently, some had people visit very often, some people used phone calls, but essentially what they did was they tried to help people think about using more insulin and getting the blood sugars down to near normal levels.

They had imagined that they would get the glycated hemoglobin, which is the precursor of HbA1c down in the normal range. They were unable to do that. What they did was in the control group it was around 9% and in the intervention group they got it down to 7%. They planned to do this study for a decade but they had to stop

early. So they only did the study for 7 1/2 years and the reason was there was a safety in monitoring board that's looking at the two groups silently in the background.

And they saw a vast difference in between the rates of diabetic nephropathy, in the diabetic retinopathy; that is the kidney and eye disease... and they felt that it was immoral to keep this knowledge from the general public. So they had to stop the study, they ultimately presented the data to the American Diabetes Association; they published it in the New England Journal. So that study changed our field forever.

It was a very expensive study to do; they used an immense amount of resources, but what it showed is that very tight control and blood sugars that were near normal could reduce the rate of diabetes complications in type 1 diabetes. And that's really exciting. So for people who live with type 1 diabetes it means that these terrible complications like blindness and kidney failure, that those things are not absolutely given and that there is a possibility that people could begin to prevent those.

Bret: And it's sort of revolutionary, because if you were born with type 1 diabetes there's almost no chance you're going to live sort of a "normal life" or a healthy lifespan until we learned that a more intensive treatment improved those outcomes. So it was pretty revolutionary for the treatment of diabetes, but it came at a cost, right? Because this isn't something you can just dial in and be accurate with 100% of the time and the risk was you would lower blood sugar too much and people would become hypoglycemic and symptomatic and possibly life-threatening.

So there needs to be a balance. Now I want to talk about how it's sort of traditionally done now in the sense that people are told to eat a certain amount of carbohydrates and cover it with the right amount of insulin. So people with type 1 diabetes are supposed to know how to calculate exactly how much insulin for exactly how much carbohydrate. And if you do too much, you get hypoglycemic. If you don't do enough, your blood sugar goes too high. So tell us about the intricacies of this calculation because it sounds simple; you calculate your carbohydrate, you calculate your insulin. But in practical purposes it's not so easy, is it?

Jake: Yes so there's all these different variables that are actually affected. You're supposed to carry out this algebraic equation. And so you're supposed to know your insulin to carbohydrate ratio and also your insulin correction factor; that is the amount of insulin that is required to reduce your blood glucose. And so imagine if your blood sugar is slightly above normal and you need to reduce it to the normal level and then you also want to consume some carbohydrate, then you would carry out this calculation or use some app on your phone.

And then you administer the insulin and then you're supposed to administer the insulin, at a precise amount of time before the meal starts. So imagine, I'm going to eat in 25 minutes and I believe that this meal contains exactly 75 g of carbohydrates. So that's a guess but then how do you really know how many grams of carbohydrate you're consuming? And another question goes, "Are there other elements in the food that could modify the kinetics of the glucose absorption?"

And so in some cases people consume quite a bit of fat and those carbs are very slowly absorbed. In other cases people will have abnormalities in the G.I. tract. So type 1 diabetes is associated with loss of insulin, but it's also associated with the loss of another hormone called amylin. And so amylin is a very potent regulator of gastric emptying and so people with type 1 diabetes will empty their stomach quite rapidly.

And so you could have some instances where even though you give the right amount of insulin, it doesn't act fast enough. And you're also trying to match the kinetic curve of the insulin that you administer to the glucose rise and that's hopelessly difficult to do. And then you're also trying to think about your insulin sensitivity is a static factor, but it changes in different people. It can change in women based on the stage of the menstrual health.

Bret: And what about how well you've slept and your stress level--?

Jake: All of that.

Bret: --and if you've exercised...? All that plays into it. So how does this play on the emotions of most people who are teenagers when they're trying to deal with this and calculate all this? And I imagine it would just be very difficult for a lot of them to handle.

Jake: Well, it depends upon your level of scrutiny. So if you're a-- most kids with type 1 diabetes are diagnosed when they're around 8 or 10 and their parents are there helping them and if your parents are taking care of it and they are helping you and you don't have to think about it, then things are okay. You know, they tell you what to eat, you take the insulin at the appropriate time, you check your blood sugar three or four hours later...

There will be some disasters if you take too much insulin or too little, but from hour to hour, day-to-day the burden isn't all that great. I mean it's a challenge to do all this stuff, it's very scary for families and there are dangers, but as kids get older, as they become teenagers and beyond, they start to think really hard about these challenges and they become frustrated because they'd like to go out with their friends, they'd like to have some spontaneity in their life, they don't have an adult watching over them, making suggestions about what they will eat and when and how.

They're trying to build their independence and then they begin to experience what I would call these glycemic disasters where they take too much or too little, the blood sugars can be really high. In some cases they just forget to take insulin. Teenagers have a bunch of things on their minds and living with a chronic illness may be further down on the list compared to where their parents or their health care team may want them.

Bret: I think really all you need is one bad episode of hypoglycemia to feel how awful that is and if it's in public with your friends it can be my embarrassing that you never want that to happen again. So I could see people purposely under-dosing their insulin to make sure that doesn't happen, thus the cost being running higher blood sugars than they would otherwise like to, simply to try and avoid that.

Jake: We see this throughout the healthcare system, there are many nurses who "like to run their patients' sweet". If you've worked in an academic medical center or community hospital, we've all seen this where the health care team feels more comfortable seeing blood sugars go high and it's because of a fear of hypoglycemia. But unfortunately, for the people who live with type 1 diabetes or for that matter type 2 being high over the long time makes them feel awful not just placing them at risk for complications.

But it's hard for you to feel normal when your blood sugars are high. And I have a friend who has type 1 diabetes and he went on a very tight regimen and was able to get his blood sugars down to near normal and he said to me, "You know, Jake, when you have type 1 diabetes "you forget what it's like to feel normal. "If your blood sugar is high all the time, you just think that this is the way your brain is going to work." And there are people who lose sight of a normal healthy life, because their glucoses are always high and they just feel awful.

Bret: It's really depressing to hear, but now looks like there is another way to do it. So when we talk about treatment goals, the traditional treatment goal was an HbA1c of 7, right? And by a lot of the guidelines to try and balance the benefit without putting people at higher risk. But we know the risk starts well below 7. I mean the risks starts in the high-fives and certainly in the mid-sixes. So why wouldn't you want to treat to that level was because we don't want to put people at risk for hypoglycemic episodes because of that swing, that variation. But is there a better way to treat the lower levels without having them have those swings?

Jake: Many healthcare providers have given up on being able to get the patients that they support, to get their blood sugars down in the normal range, that is to say with a HbA1c under 6%. And part of it is that they don't want to impose that burden and they have begun to realize that it's unrealistic. So a lot of healthcare providers say, look

that's pretty good, you're fine, actually many adults with type 1 diabetes will go to primary care or a primary endocrinologist and they say, you're doing pretty good, your HbA1c is 7.5, that's fine. So these healthcare providers are trying to balance the challenges and the trade-offs, which include hypoglycemia and weight gain...

Bret: Yeah.

Jake: So too much insulin, as well as the burden and the intensity of the therapy. And in comparison they feel like, well, you know, if you did it any less, it would be very challenging. So I'm just going to walk a fine line in the middle. And they don't see that many people who have blood sugars that are near normal. So they're not even aware that there are new therapies. It's a little complicated with type 1 diabetes.

I just want to briefly mention the issue around novel therapies or the cure. There has been a lot of hope that there would be transformative therapies for people with type 1 diabetes and if you ask any parent of a child or any adult with type 1 diabetes about this issue, they will tell you that they've been given narratives around when the cure might happen for type 1 diabetes and there's really a lot of hope that there would be some new novel transformative therapy that would help people with type 1.

And that could obviously take place in the form of some sort of biological cure or some sort of technological advancement. The problem with talking about the cure is it's a long and winding road to advance science. And so in my world-- my world as a basic scientist, what I've seen is it seems like we're constantly moving the goal line further and further away and the reality is the science of type 1 diabetes, how it happens, how the immune system decides to attack the pancreas, how the beta cells respond, why they decide to not make more beta cells or how you would make beta cells in the first place to potentially replace them...?

All of those questions remain quite unsettled. And so at least from a parent's perspective there's still-- there has been this thought that well, you know, it's coming around the corner. And so families are often told, you know, when is it coming... it... when is it coming.

Bret: Just hang in there until "it" gets here.

Jake: And so I've heard "it" be a biological therapy, I've also heard "it" as a technological therapy. Are we going to infuse insulin or some other hormone and by doing this and running through some app, blood sugars will be near normal. But those clinical trials have also progressed and I think it may be very, very difficult to completely reverse type 1 diabetes with technology.

Bret: So we need better ways to control it and improve it until that time comes. And the role of diet is something that really I don't think has been talked about much. Until the past year or two really it started to become much more popular because we've been so comfortable with this concept of count your carbohydrates, cover with insulin.

Jake: To your best, hang in there.

Bret: Hang in there, right, exactly. So what about just dramatically reducing carbohydrates to ketogenic levels or very low carbohydrate levels? What impact can that have on patients with their need for insulin, their variation in their blood sugar, their A1c's or psychology? Tell me about that.

Jake: I want to differentiate... there's two major low-carb approaches in type 1 diabetes; one is the approach that was pioneered by Dr. Richard Bernstein which is really low-carb high-protein. And he has emphasized protein in large amounts and he tries to minimize ketosis. And so his goal is to get people to consume lots of protein and to cover the protein with insulin. And he's advocated using very judicious amounts of insulin. They typically use an intermediate form of insulin; something called human regular, which isn't used all that often anymore.

Bret: Because proteins are a little bit slower to absorb and the blood sugar rises slower and has a longer tail with protein compared to carbohydrate. So you need a sort of a longer action on your insulin.

Jake: So Dr. Bernstein has written this amazing book, which is the Diabetes Solution and it's now in its 12th edition and he was diagnosed many, many years ago, he's now 85, he doesn't have any major diabetes complications. So he is the living testimony to this approach. It's really remarkable and he has thousands and thousands of followers. There's a Facebook group that's devoted that is called Typeonegrit, that's devoted to this approach and that's been very, very successful. Another approach is to go all the way in nutritional ketosis.

And to get into ketosis you have to consume quite a bit of fat. So if you're low-carb high-protein, that's eating meat or steak or things like this. Low-carb high-fat you have to aggressively think about ways to get more fat in your diet. One advantage of nutritional ketosis in type 1 diabetes is you're not consuming that much protein and therefore there's less requirement for all that insulin to cover the protein. But one potential downside is that the ketones begin to rise.

And so you can have people with type 1 diabetes who are in nutritional ketosis with beta hydroxybutyrate of around 1 mM and that scares some people. We haven't had a lot of really good studies about people in nutritional ketosis and type 1 diabetes, but

from my anecdotal experiences, speaking to people what I find, is that it's actually a relatively safe condition. So people are able to do that.

And essentially what they're doing is they're restricting carbohydrates, they are taking not that much carbs, very few refined carbs over the course of the day, consuming protein and they go out of their way to find fat in their diet. And if you look at the macronutrient distribution it's around 70% fat. So those folks eventually what they'll do over the course of a few weeks it's switching to this approach... they become fat burning.

Because fat is the only macronutrient that's consistently available in the blood and their body adapts to burning fat. And so they start to essentially consistently burn this macronutrient that's always available and they lose all the variation in blood glucose and so--

Bret: They lose the variation so that sounds almost like a negative thing, but actually what you mean is their blood sugar is rock solid. You don't have the highs and the lows and you're not requiring as much insulin.

Jake: So in milligrams per deciliter some people will describe a typical person who lives with type 1 diabetes might have an average blood glucose of say-- who's struggling... might have a blood glucose of say 180 mg/dL or 10 mM. That would be somebody who's really having a hard time and their standard deviation might be somewhere around 100 mg/dL or 5 mM variance.

So these are people who are bouncing from high to low all the time and if you then compare that to somebody who's in nutritional ketosis, who has learned to do this and do this really well, they can get their blood glucose down to somewhere around 110 mg/dL which is simply amazing, so 6 mM. And they can get standard deviations down to around 30 mg/dL or 2 mM.

Bret: That's a fantastic change. What impact does that have on the patient?

Jake: Well so, the most obvious thing right away is that the blood sugars aren't bouncing between high and low. And there is a tremendous cognitive burden that's associated with living with diabetes and thinking about your blood sugars all the time. So when you look down to your blood sugars and you realize that they are near normal all the time, you start to forget about diabetes and you start to think about other things in your life. So right away people notice and they describe that they get what I would call cognitive real estate.

They get back some of their ability to think about things other than diabetes. They will also often lose weight. And the reason is all that excess insulin is associated with

weight gain. And in the original DCCT trial, the people who were on that intensive therapy gained quite a bit of weight. Too much insulin - ultimately fat growth, lipogenesis.

And for people who go on nutritional ketosis, be it people who have diabetes or don't have diabetes; they virtually all lose weight. So it's a very potent way to lose weight and many people with type 1 diabetes who stay in nutritional ketosis start losing weight and they will lose weight all the way to the weight that they were in back when they were say 16 or 18 years old.

Bret: That's powerful especially when you talk about sort of the emotional state where the ability to think about other things because people who don't suffer from a chronic disease like type 1 diabetes take that for granted. And it's hard for us to even imagine having to constantly think about your health and your condition and not have the ability to think about other things in life. So I mean, that's so powerful.

But let's talk about the practicality of it, because people-- there are a plenty of people who said, "I've tried ketosis; it's too hard" and there are a plenty of people who do it and thrive on it and it's easy to do. So when you're talking about teenagers and 20-year-olds, what's the practicality of this type of intervention to help people?

Jake: Well, the way I think of this is it's a tool. And so my goal as a clinician is to teach people the power of the tool and to allow them to use it when they decide to use it. It's not up to me to sort of judge that, "you need to go on low-carb" or "you need to try nutritional ketosis" or, you know, "you have to use this and you shouldn't be eating carbohydrates." I don't get to choose, I'm not the person who lives with type 1 diabetes.

So I think it's up to us to support people. If someone's curious about it as a clinician I try to teach them how to do it and I ask them to be very aware of what they're experiencing with the hope that they will be more holistic about what the tool is. And then they can make their own decisions, but I try to allow them to consider not just the medical benefits, that i.e. with low-carb you might be able to get your blood sugars down to a near-normal level.

16-year-olds are not sitting around worrying about whether or not they're going to get diabetes complications when they're 70 years old. I think that the much bigger issue is how do you feel, how do you want to feel. You know, are you upset about the way it's going with diabetes? Are you curious to try to find a different way? How much of a burden is it currently?

And I've interacted with teenagers who you would think don't actually care about their diabetes at all. You know, someone who's sitting in the exam room who has a pump,

but the pump, they never change the catheter and they struggle with very high blood sugars and they're losing weight because they're peeing out a bunch of glucose in their urine and they look sullen and exhausted and angry and if you asked them, "How do you feel about living with diabetes? Do you think about it? Do you think about it often?"

And quite often they would just start crying. And so what's happening is someone who isn't working actively to treat their diabetes by checking all the time and administering insulin... It's still thinking about diabetes. And they feel tremendous guilt and shame and they wish they could do something better but they can't motivate themselves to actually get up and do it.

As adults we're all teenagers at some point and you can remember feeling overwhelmed and also feeling unable to take the initiative to do things that probably would be beneficial to you in your life, but there's always some homework assignment that goes undone, some job that could've been done a little more carefully as a teenager. They're growing up, right?

But I try to encourage them to understand this as a potential way to feel better and my hope is to build habits. I don't know if you've read this book the Power of Habit, I just love it, and I love the idea that we could find ways to learn to build these systems into our life that could ultimately be beneficial and allow us to focus on the things that we really care about.

Bret: That is powerful, especially if they can experiment with it and finally experience the feeling of feeling better and not being burdened by the disease. And it sort of comes up against the desire to be "normal", whether it's a parent just wanting their kid to have a normal life and the emotions of the parent, or the kid is just wanting to be part of the crew and go out with their friends and not have to worry about it.

There's definitely a conflict there between doing what you can do to feel better and improve your health versus "fitting in". And I'm sure that's something you must address on all the time with the patients.

Jake: So that kind of conflict, I think is recognizable to any parent of a teenager. And my kids are now no longer teenagers, they are in their 20s. But I can certainly remember, and kids really want to be able to do their thing. Not all of the conflict is actually what it seems on its face. So sometimes teenagers will generate conflict as a means of trying to show that they are upset about something.

And they are looking for a loving structured response from a parent. So a teenager will say something like-- I can still remember my kids would-- One of them really

knew how to get me upset and she would do it as a way of trying to show me that she was upset. And my wife would look at me and say, "Hey, I need to talk to you." She would pull me into another room and say, "You know, she's trying to get you upset. And I have news for you... it's working."

Bret: It frequently does, right?

Jake: And so you know it's our job to be there to support them. And in some cases what they're looking for is a loving structured response; "Hey, it's okay, I understand why you would feel that way. Let's give it some time and we can talk about this in a bit." And teenagers are in some ways also like toddlers. They are looking for a structure and they're looking to know that their parents care about parenting enough to be able to bring their A game...

So what's the A game? It's imagine yourself as a parent and looking at your roles and your responses and saying, "Am I doing this in the way that I really would hope that I could? Or am I getting caught up in the moment." I think about this a lot in medicine and I sort of imagine myself as a coach and I'm trying to build people, to build the persona, the health persona that somebody has. Either the person who lives with a chronic illness, or a parent.

And I'm trying to show them that they think very deliberately around their lives and they're mindful, they can be aware of the way they respond and they can make more thoughtful, meaningful decisions. We don't have enough emphasis on mindfulness when we talk about chronic illness and yet it's so important. The decisions that you make for day-to-day, hour to hour and minute to minute add up and they alter how you perceive your experience of living with chronic illness.

Bret: Yeah it goes a lot deeper than 'just take your medicine', that's for sure. I can just imagine how these discussions need to take place and not just in one visit, someone's not going to get in just one visit. This is over months and years and years of working with people to try and help them understand these concepts.

Jake: You had a five-minute mindfulness handout. Okay, you got aromatherapy, meditation, some exercise... see about it.

Bret: Go... go do it.

Jake: We have to build relationships and ultimately build trust. And again what I love about medicine is the opportunity to work as a coach and to help people live their lives and to carry out the growth around health conditions so that they can also ultimately achieve their goals. They're not my goals so it's really important that you--

I really imagine myself as a facilitator, as a Sherpa; I'm there to help them to carry this burden and to think creatively about ways to do it safely.

Bret: That's a great way to say it - to think creatively about ways to do it safely. And it's clear you're doing a great job with it with a potential amazing impact. But what about the structure of healthcare now? Is it supportive of this way? Or are most people, if they talk to their doctor about going on a low-carbohydrate diet to help treat your type 1 diabetes, are they going to hit a stonewall when they talk about it? What's the culture now?

Jake: You know, it varies from place to place and from provider to provider. If you look at the American Diabetes Association guidelines, which they call the standards of care and you look around low-carb and diabetes, what you actually see is that the American diabetes Association is permissive, it has endorsed low-carb as a possibility.

Bret: For type 1?

Jake: For type 1 or for type 2, they don't differentiate.

Bret: Okay.

Jake: They do not endorse it for children or for pregnant women or for people who are taking this new class of drugs, these SGLT inhibitors. But for the rest of the population they are permissive. They leave open the possibility of low-carb. So there's a misconception in the community that the American Diabetes Association or these other large organizations that they are prescribing particular kinds of foods or macronutrient distributions and that they will not allow low-carb.

That is generally incorrect at least for adults. So we are growing as a discipline, we're becoming more open-minded, we recognize that most people who live with diabetes, type 1 or type 2, they have a very hard time achieving the glycemic targets to minimize complications and the diabetes associations are becoming more permissive about allowing low-carb. Unfortunately healthcare providers and nutritionists still haven't adapted to this.

So every year when the standards of medical care comes out, the American Diabetes Association document, I obsessively read it and I go through it and I do keyword searches and I try to see how the language has changed from year-to-year in order to determine whether it's growing and evolving. What I've seen over the past five years since I've been doing this is it really has changed.

So the American Diabetes Association has become much more aware of the existence of low-carb and they don't explicitly prevent it from-- as an eating pattern. Now you

will get a different response if you go to your health care provider because many of them were educated in a different era and they believe that you have to consume a particular amount of protein and fat and carbohydrate and that's it.

Many of them are prescribing the so-called macronutrient distribution ratios from the Institute of Medicine guidelines, the so-called AMDR, that came out in 2002 and that's a very odd document and unfortunately-- So the AMDR has made this almost arbitrary decision that too many carbs would cause hypertriglyceridemia and potentially could alter cardiovascular risk. And too much fat they believed would cause obesity.

So they chose a middle ground believing that that was the way to minimize complications and ultimately advance the health and wellness of people with diabetes. Unfortunately actually they used that for the general population but is applied by diabetes organizations as also applying to diabetes and the rationale was people with diabetes are a great risk for cardiovascular complications so we should give them the diet that is generally accepted to be best for the general population.

But what we now know is those calculations were really quite arbitrary. And if you read the Institute of Medicine document what you see is an immense amount of subtlety around this. So it's very hard, so let's go back to the person who goes to their local diabetes doctor or endocrinologist or primary care doctor or they see a diabetes educator.

That person will have been educated in a different era, may have had a summary of what was generally accessible at the time as the best available evidence and the field-- and most people are receiving health care based on a scientific consensus that was generated 20 or 30 years ago. And if you try to talk to them about what you might have learned from the Internet about low-carb or something else, people will get very defensive.

So that's a challenge and some doctors have been eager to learn new things, other people are very, very defensive and in the worst-case scenarios I've heard of patients getting fired but their doctors. So getting a letter that says, "I want to let you know that you will no longer be able to come see me. "I will provide health care for you for the next 30 days. Here's a list of available providers in your area... see you... bye."

Bret: All because they don't want to talk about diet. They don't want to talk about lowering carbohydrates.

Jake: Well I'm not sure about that. I think that these are well-meaning providers who believe that there may be a grave danger to pursuing low-carb.

Bret: They are afraid.

Jake: And so you know there's a somewhat of it a debate amongst us who were interested in the low-carb community, I want to bring this up. So some people have believed that the doctors are really arrogantly prescribing their particular approach and that they're excluding or that they're prejudiced against low-carb and that they simply aren't open-minded. I'm a little more charitable about this.

I think they're simply doing what they think to be best. And I spend my nights and weekends reading about the low-carb literature, reading the latest study, reading the latest guidelines and I try to keep up but it's a subject area that I'm intensely interested in, it's become my hobby. Not every healthcare provider will be similarly motivated to learn in this particular subject area. So I think there's a lot of really talented well-meaning docs who simply haven't been exposed to the transformative power of low-carb approaches, be it for type 1 or any other condition.

And frankly there also is in a lot of scientific consensus. So I've been telling you what I do clinically but I cannot point to the well-structured, well-funded randomized controlled clinical trial that's been carried out by a large organization, be it the US NIH or in Europe or some other organization. And the reality is there hasn't been enough hard-core research on low carbohydrate nutrition for lots of metabolic conditions.

Bret: Yeah, it's a great point to emphasize that we can see the benefits in the short-term, we can see the benefits with lab results and how people feel, but we don't have that long-term survival and decrease complication data, although it makes sense, you know, sometimes you have to operate outside of the evidence when it simply doesn't exist and it makes sense that if you're hitting all your markers it would lower your risks but we can't prove that.

And on the other hand this can be a dangerous thing to do. You have to be very vigilant of checking your blood sugars and adjusting your insulin quickly because things can change very quickly. And we don't want people just trying it on their own, with no guidance. So what kind of advice can we give to somebody who's looking for some help and looking for some guidance.

Jake: There's a lot that's been written about low-carb and diabetes and specifically low-carb and type 1 diabetes. So again I mention Dr. Bernstein's book, but he also has a YouTube channel with lots of videos and practical advice and then there's also a Facebook group called Typeonegrit, T-Y-P-E-O-N-E-G-R-I-T, and these are people who were followers of Dr. Richard Bernstein and they support each other in this community.

There's 3000 members, it's really a wonderful organization. So that's been very, very successful. And then there's other books as well. So Adam Brown has written a terrific book on diabetes and Dr. Keith Runyan who is a nephrologist who has type 1 diabetes has written a book on nutritional ketosis and type 1. So there's an emerging literature but what I'm saying is it's important to educate yourself and to look around and there are a bunch of resources.

It will be very important if you carry an-- if you have type 1 diabetes and you want to carry out an experiment around low-carb to be careful about the amount of insulin. So there are some people who are on fixed doses of insulin, they take pretty much the same amount of insulin from meal to meal and from day-to-day and if you wake up in the morning and you normally consume 75 g of carbohydrates and instead you decide to eat bacon and eggs or to fast and you take the same dose of insulin you're going to go low.

So it's important to adjust insulin doses downward dramatically in order to figure out the right dose. And it's going to require a lot of experimentation. So there are some people who only check the blood sugars with finger sticks, other people have access to these new continuous glucose monitors. I think those are really great for low-carb and type 1. They provide so much data that allows you to think much more holistically around what's happening to your blood sugars and how any particular meal has contributed to blood sugar outcomes.

Bret: So I started this episode by saying I was very hesitant to recommend low-carb for anybody with type 1 diabetes, but after learning from you and others now I think they're almost a perfect population for it, and part of that is the use of the continuous glucose monitor and the insulin pumps because they more than anybody can finally control their blood sugars and their insulin far more than anybody else.

But it takes vigilance, it takes care and it takes a lot of work, but it's certainly possible and powerful as you've demonstrated. So tell me what are your hopes for the future? What do you see coming that you think might be revolutionary or really help patients in this field?

Jake: Well I'd like to see more access to continuous glucose monitors. That's the first thing, because they are expensive and I think as the price drops, as people become-- as they start to get on the continuous glucose monitors they become more and more aware of hidden glycemic excursions, these surges up and down. And those folks will then become more motivated to try to learn new creative solutions to how to control those sugars.

So CGM is in some ways like the gateway drug to low-carb because it provides the impetus to try to find a new way. And I don't want to give you the wrong impression that I think that the low-carb is the primary tool to improve sugars. There's a bunch of other things you can do as well. Exercise is incredibly important, especially endurance exercise. So I would recommend anybody who's thinking about trying to improve their type 1 diabetes control to consider endurance exercise like running. Running is a fabulous thing to do.

Bret: Yeah, we talk a lot about high intensity interval training and resistance training and sort of cardio endurance training as sort of almost gotten a bad name lately that it's not as effective, but in this specific scenario it seems like it is the most effective.

Jake: Yes so there's a unique pathway in a slow twitch muscle whereby exercise can promote glucose uptake in the skeletal muscle and so you can create this sponge that's drawing glucose off of your blood into the muscle by doing a bunch of endurance exercise.

And there are people with type 1 diabetes who use this to a really great effect, who run marathons, who run all the time. And those people quite often will have very, very low insulin requirements. And in comparison high interval training-- high intensity interval like training... people have these big muscles. That musculature does involve some carbohydrate of course, but it often also involves insulin.

Bret: And that type of training can transiently increase your glucose as well.

Jake: Yes, epinephrine.

Bret: --chasing cycle as well, so yeah, it's a little more complicated.

Jake: And then sleep of course is also really important. And many young adults are sleep deprived they "catch up on the weekend". And so I really advise people to think very carefully about how much they're sleeping and try to develop careful sleep habits so that they're going to bed at the same time every night even on the weekends.

Bret: This has been great, thank you so much for your time and for all your knowledge and your work in his field and I really like how you balance the message between-- approaching people as people, not just a science experiment of glucose and insulin, but what it means to them as a person; I think that's so important and when we all need to learn that lesson.

Jake: You know, we are really just here to support people and so helping them to think about their bodies and live their lives the way they intended to. I think really that's our role in healthcare.

Bret: Great, thank you very much and I look forward to hearing more from you.