[00:00:00] **Melissa:** Hello. And welcome back to the sound bites podcast. Today's episode is about carbohydrates and specifically at the latest science on defining quality carbohydrates and what is needed for future carbohydrate guidance. I have two expert guests today. I have Dr. Sid Angadi and Dr. Julie Miller Jones. This episode is a collaboration between sound bites and potatoes USA, the nations, potato marketing and research organization representing more than 2,500 potato farming families.

Potatoes USA is committed to providing the nutrition science community with evidence-based information about the role of potatoes in healthy lifestyles. But this episode is about carbohydrates of which potatoes are a starchy vegetable, so we will be touching on them. But the overall arching conversation that we have today, again, is about quality carbohydrates and what that means.

So I'm really excited to introduce you to my guest expert. Dr. Sid Angadi is a cardiovascular physiologist whose work focuses on the effects and interactions of exercise, drugs, and diet in healthy individuals and in chronic disease. He's an assistant professor in the department of kinesiology at the university of Virginia and has published a significant body of work examining the weight independent effects of diet and exercise with regard to reducing cardiovascular risk.

My second guest is Dr. Julie Miller Jones, a certified nutrition scientist, and certified food scientist and professor emerita from St. Catherine university in St. Paul, Minnesota. She's a frequent speaker for many professional conferences and consumer organizations locally, nationally, and internationally on carbohydrates, grains, and whole grains diets and food safety.

And actually she was on the podcast before, back in episode 94, hands down my most popular episode called the whole truth about grains. So welcome you both to the show.

[00:02:06] **Julie:** Thanks for that. It's great to be on again and thanks so much for and introduction. My pleasure.

[00:02:14] **Melissa:** So as always, after I introduce my guests, I really want.

My guests to share more about their background. So I would love to hear how you got interested in this field or the specific work that you're doing related to carbohydrates. Anything that you would like to share with our listeners. So we can get to know you a little bit better. And of course, as always any disclosures that you have to note.

So let's start with you, Dr. Sid Angadi

[00:02:41] **Sid:** I have two disclosures, I serve on the scientific advisory board for the grain foods foundation, and I'm also on the scientific advisory committee for the quality carbohydrate coalition. So as a cardiovascular physiologist, what I'm really looking at most of the times is how exercise, drugs, and diet interact in the setting of more often than not chronic disease.

So my specialty is really heart failure. And more recently I've been looking at mitigating the effects of cardiotoxic chemotherapies, but in the past couple of years, I've also examined how. Foods interact with cardiovascular function. And specifically there are strategies that can be used to mitigate some of the cardiovascular issues that can be seen with certain.

And that's how I sort of got involved in, in this area.

[00:03:31] **Melissa:** Excellent. Thank you. And can I call, you Sid, or doctor Sid, or Dr. Angadi, what would you prefer? Sid is great. Okay, great. Thank you. And Dr. Julie Miller Jones, my listeners may be familiar with you, but just in case would love to hear more about your background in your work as.

Well,

[00:03:49] **Julie:** I've been interested in grains, partly because of where I live. And I live in Minneapolis St. Paul and the American association of cereal chemists had its headquarters here. And I always told students that they should be involved in all the scientific organizations they possibly could. So I started early with both the food technology and the dietetics association and the food and consumer science association and the national council against health fraud.

But one of them was a serial chem. And so because of that then I got on the nutrition part of that association and worked on the definition of what. I whole grain. What's a whole grain food and about what is the role of cereals in the diet? So that's one of the ways I got into carbohydrate. The other is I've always been interested in diets and the low carb diet has been around since I was a teenager.

In fact, true confession. I went on it and so I then became a professor and I was always trying to look at what is the role of carbohydrates in the diet and do we need any? And so that's one of the ways I really became interested in this

[00:05:05] **Melissa:** topic. Excellent. And we get into your story back in episode 94, about your dieting and a lot about grains and carbohydrates.

And then we even added on a little chemistry lesson. In the outro. So I really encourage people to go check that out. Julie, you'll remember back in the day that this was about three years ago. And before I released the episode, I played it in the car for my 70 year old mom and my ten-year-old son.

And they both were just glued to the audio and what you were saying. And they both got a lot out of it. So I was like, well, this is something for everyone, I guess. But what I'd like to do is set the stage before we dive in to all things carbohydrates, it's a really confusing topic and maybe somewhat polarized topic, but it just seems like there's a lot of confusion about carbohydrates and the role of carbohydrates in the diet.

We see this playing out with like the keto diet, the paleo diet, and just in general, this idea to cut carbs or limit carbs. And I'm a dietitian, but I'm also a certified diabetes educator. This is in my world all the time. And there's a lot of myths and misperceptions about carbohydrates and quote-unquote starchy foods.

And even some of our health professional colleagues disparage starchy foods, potatoes, starchy vegetables in general, not to mention white foods when they emphasize like eating the rainbow. And it's interesting because starchy foods like nutrient rich vegetables, like potatoes, they've been misrepresented in the media.

And like I mentioned, even among the nutrition science community as foods that should be limited. So I'd like to start off with. Both of you weigh in on what does the current nutrition guidance say about carbohydrates? So Dr. Julie Miller Jones, can I call you Julie or Dr. Julie? What would you

[00:07:05] **Julie:** absolutely.

[00:07:06] **Melissa:** Julie is great. Okay. Julie, would you like to weigh in on that first? And if Dr Sid has any additions, then he can weigh in as well.

[00:07:14] **Julie:** Actually, the national academy of sciences recommends that people get 45 to 65% of their calories from nutrient rich carbohydrate foods. That's like fruits, vegetables, legumes, whole grains, not seeds, starchy roots, and tubers like potatoes.

It does not include what I call doodles, ding dongs and donuts, which are the things that are not recommended in any plate or a pyramid. Those are sugar, salt, and calorie laden and not nutrient rich, but recently there was a study in Lancet which showed that people who ate half of their calories as carbohydrate lived four years longer than people who ate far less or people who ate far more.

So the sweet spot is about half your plate in terms of living longest, the only exception to the 45 to 65% is that some diabetes education. Find that if they go to 40%, that is helpful. And Melissa, you might want to weigh in on that. And where should you go even lower than 45, which is recommended by the ?

Yeah. So, I

[00:08:36] **Melissa:** mean, I think 40 sounds reasonable and of course it would have to be individualized to the person. If that little extra tweak helped them that would seem reasonable because then that leaves 60% of your calories between fat and protein and see how I did the math there.

And of course there's plenty of heart healthy fats to choose from. And. I talk about protein a lot on the podcast. And there's a lot of research out there that speaks to the RDA versus the AMDR that acceptable macronutrient distribution range, which can be quite a large range as I mean, we've got these three macronutrients between the three of them.

We're looking at adding up to a hundred percent of our calories. So certainly there can be and would be some fluctuation there or some what's the word some wiggle room there, but yeah. Going below 40 for, for carbohydrates, I don't see that being realistic or necessary. but Julie, what else can you tell us about this current carbohydrate guidance and you've noted.

I mean, it's, it's a diverse group we're not just, when we talk about carbs, we're not just talking about grains. We're not just talking about starches. We've got the fruits and vegetables and you mentioned the legumes. So what else can you tell us about this diverse group and the current

[00:10:01] **Julie:** guidance for a 2000 calorie diet?

The most recent dietary guidelines recommend five cups a week, or the equivalent of starchy vegetables. They recommend that. Just behind the most recommended, the highest recommended is red and orange and yellow vegetables. It's actually, they recognize the need for starchy vegetables in terms of whole and refined grains.

They recommend that we have approximately offer a 2000 calorie diet, approximately five, one ounce equivalents of grains. That's about if a slice of bread is about 80 calories and we five a day, you can see that's between 450 and 500 calories. And so we have a fourth of the calories they're coming from grains and another from the.

Carbohydrates like starchy vegetables. And then we add in what we want to do is the more plant-based diet so that we have some of our entrees coming from legumes and some of our snacks coming from nuts and seeds. That's the way we get to that 50% of our calories as healthy carbs. Yeah. I

[00:11:21] **Melissa:** think some people think, oh, well, you're just eating pasta all day and it that's all your carbs, but there's quite a bit going on there.

I want to back up a little bit and maybe Sid you want to weigh in on this talking about how carbohydrates are the body's preferred source of energy.

[00:11:37] **Sid:** Sure. Yeah. The, the interesting thing is that as you mentioned earlier, there's a lot of talk about cutting carbs. But I think it's important to take a much more holistic view of food and not take such a reductive sort of view in the first place.

Things are more than just calories in or out. And I just like to add a little bit also to Julie said, which is, I think it's important to recognize that carbohydrates sort of form the baseline on which a lot of heart healthy diets are built as well. Like for example, the dash diet, which is the dietary approaches to stop hypertension.

But then getting back to the question you asked, which is talking about how carbs are the body's preferred source of energy. The interesting thing is that carbs are the predominant fuel. Obviously in the brain, but also that they stimulate their own oxidation and they're tremendously useful, especially when you're performing higher intensity physical activity.

In fact many years ago there was a very interesting study that looked at the diets of World-class Kenyan marathoners. And the reason why they looked at Kenyan marathoners was because the top 95 or so, or top out at the top 100 marathon times are from Kenyan marathoners specifically they're from one tribe called the .

And about 70% of the daily calories came from carbohydrates. So carbs are really the fuel of choice for high intensity activity as well. And that's largely because you just get more ATP or more energy per liter oxygen compared to all

the other fields. If you want to be fast, carbs are the way to go, but yeah, carbohydrates are fuel for your brain.

And the other thing to keep in mind is we are not particularly good at storing carbohydrate, which is why we keep needing to consume them

[00:13:26] **Melissa:** frequently. Yeah. We can only store so much glycogen in the muscle versus our fat stores kind of unlimited there. I did a recent episode with a sports nutritionist, Nancy Clark, and we talk about exercise and diet and weight.

So back to carbohydrates, I, as I mentioned as a dietitian and a certified diabetes educator, From firsthand experience that carbohydrates are diverse. And we've talked about that, but from a nutrition science perspective, let's talk more about these complexities of carbohydrate containing foods.

[00:15:03] **Julie:** I agree it's really very, very complex, not just in the simple versus complex, but they are really difficult to often explain to people why they are so important. For instance, we have high fiber foods and some of the fibers that are in carbohydrates are only in carbohydrate foods and they're not found in fruits and vegetables.

So when people say, well, you don't need to eat those grains or those potatoes because you can get what you need in something else. That's simply not true. The fibers are in fact different and they have different physiological functions. We want different kinds of fiber. And in fact, we know that cereal fibers do some things and vegetable fibers do other things.

And those fibers let's say maybe in a potato are doing a different thing and trapping the starch in a different way. We get different glycemic and other impacts by how big the carbohydrate molecule is, what its particle size is. For instance, let's just take oatmeal. If you want the most cholesterol lowering from your oatmeal, you'd like to buy quick oats, not instant, because by opening the structure of the grain, you actually release the beta glucan it's more available at the gut level. And the beta glucan then can actually impede cholesterol absorption from the gut. Whereas if you want more laxation, would like to eat a steel cut out or an old fashioned oat.

Or if you want more glucose control, it will leave more slowly from a particle that slow to digest like an old fashioned oat or a steel cut oat. They're all great foods. They all contain fiber, the beta glucan, which can control glucose passage into the bloodstream, how quickly it goes. They all are.

Fermented in the large bowel to short chain fatty acids, but you just get that little nuance of difference from different kinds of processing now, because I don't have any particular problem. I try to use a variety is a good way to go for any kind of nutrition thing. And so pick a variety of kinds of things and different ways of eating a food, just such as oats.

Just as an example, the matrix makes a big difference in terms of the bioactives, as some carbohydrates of lots of things. They come in with some come in, pretty clean. So you need the phytonutrients and the nutrients, and that's all a package to

[00:17:50] **Melissa:** look at. You mentioned the food matrix. Can you explain that a little bit for our listeners?

It sounds like that's the package, like everything that comes with it.

[00:17:59] **Julie:** Well, for instance, there's something called resistant starch and resistant starch comes in five different forms. But one kind of resistant starch is simply the fact that in the time that the food is in the digestive track, the enzymes can't penetrate the wheat kernel or the corn kernel, the starch that's held inside.

The kernel actually doesn't get digested. It doesn't yield calories that are absorbed. It only can produce a few calories when it moves to the large bowel and is subsequently fermented to short chain fatty acids. And to be a little bit non dinnertime talk, if you've ever in corn season to happen to look at the output, which you have, you might see kernels of corn in the stool.

And that just as an indication that some of the starch that was in that corn didn't get attacked by the end of. That's one kind of resistant starch. So there's a lot of kinds of, and that's held in the matrix of the food. So that's an example of something being held in the matrix. Some people feel that all fibers should be natural fibers because they think that the natural matrix makes the fiber more physiologically.

I don't adhere to that policy. I just talked about the effect of processing oats. So you can get some advantages by opening the structure up and letting the fiber function in the upper gut. And sometimes you want it to function in the lower gut. So then something that isn't necessarily in the matrix may be more helpful so that you need both.

[00:19:41] **Melissa:** Yeah. I mean, when we're talking about the different kinds of fiber, we're going way beyond soluble versus insoluble you mentioned cereal versus vegetable. There's so many different types of fiber. I should do an episode on that. Maybe you can come and talk about that and resistant starch, which we really don't hear about much.

I didn't know that there were different kinds of resistant starch. So this is all very interesting and just speaks to the complexity.

[00:20:03] **Sid:** Yes, you're right. That carbohydrates are incredibly complex, but it's also important. Remember that different macronutrients and consumed in different contexts along with sometimes different.

And they can favorably interact for instance. So a number of years ago, we carried out an interesting little study in which we brought in a bunch of adolescents and we fed them a high fat meal and examined their vascular function at the end following the high fat meal. And sure enough, you consume a high fat meal, your triglycerides go up, your vascular function goes down.

But when we send these individuals the exact same meal, but then we tacked on all bran cereal with that, which had a lot of insoluble fiber. What we saw was a lot of these abnormalities and vascular function largely were ameliorated. And this was largely driven by the suppression of postprandial triglycerides post-meal increases in triglycerides.

And so again getting back to what I originally said, it's important to view. Food within the context of what it's consumed as well and how they interact with each other, I think is an often ignored part of the whole equation as well.

[00:21:12] **Melissa:** Yes. Great point. And we do tend to talk about nutrients, and even if we're talking about a specific food and we're going to get into this with a glycemic index in a little bit, but, yeah.

What about the diet, the diet pattern, and, and I'm sure I know that there's limitations and research to study all of this, but the closer we can get to what happens in real life, the more applicable the results and outcomes can be. So you're both carbohydrate experts and part of the Scientific Advisory Council of the Quality Carbohydrate Coalition

So I'd love to hear each of you tell a little bit more about this work that you're doing.

[00:21:50] **Sid:** I got involved primarily as a physiologist to sort of help parse the data in terms of the body's physiological responses in the post-meal period. Following the consumption of different nutrients in this case, it was carbohydrate.

And one of the things that we've noticed across the board as someone that's been running clinical trials that have looked at acute studies with the food and diet per se, is that you see substantial heterogeneity in responses to foods. And when you see these largely heterogeneous responses, it becomes really difficult then to go back and look at markers, for example the glycemic index, which are sort of almost sold as being written in stone, but then when you start examining them in physiological context, you see that they've got such huge variability.

That's obviously a problem when you started talking about that. And that's part of the reason why I got involved in this process.

[00:22:48] **Melissa:** Interesting. You said the word heterogeneity and I'll admit like, this is kind of a newer word for me in the last year or so. So that just means like there's a lot of variety and a lot of variability, right?

It's a

[00:23:02] **Sid:** huge variability in people's responses to carbohydrate consumption. The thing to understand here is that. To some extent, these responses are driven by food you consume, but on the flip side, these responses are also driven by things such as your age, your genetics, which is your family history, whether you exercise or not and so on.

And so there are these markers that are thought to be driven primarily by the food that you consume. But in reality, what you find out is that it is a massive interaction between the food, the person and the environment, and it makes drawing conclusions from these sorts of markers, particularly difficult.

[00:23:48] **Melissa:** Excellent. Thank you. Yes. And of course we see this with patients all the time. One person can have white rice and they're fine. The other person, they might need to switch over to the brown rice and then they're fine. So that's really interesting. Julie, was there anything you wanted to add

[00:24:03] **Julie:** to that?

Yeah, well, I started the scientific advisory council was really outshoot from a group of scientists were called to talk about carbohydrate quality. After there

was an international paper, said there was a consensus. On carbohydrate quality. And the consensus was that glycemic index define carbohydrate quality.

But the problem with the consensus is that it was a little, like what I call the coalition of the willing in that they only invited scientists who were in favor of the glycemic index. So it was their consensus, but it wasn't a universal consensus. And so we, it really bothered us that if the glycemic index is an indication of carbohydrate quality, that a Mars bar would get a good score and a whole grain bread or a potato will get a terrible score.

Yeah. And so there were a number of reasons why we thought this was just wrong. And then that led to the current council, which has more scientists on it. And we're trying to put together. An algorithm, which will help consumers decide what is a quality carbohydrate, and it will be based on what nutrients does it deliver, what fiber does it deliver?

Is it a whole grain or not all kinds of characteristics, not just one simple variable measure, which is the glycemic response. And so we know that rice is important in Asian and Latin American cultures. We know that these carbohydrates really are meaningful. And so we wanted to also look at various diets and cultural eating patterns so that when we make a nutrition recommendation, it can fit for all different kinds of individuals and their traditions.

[00:26:02] **Melissa:** Yeah, absolutely. Absolutely. And we're going to talk more about that and I, I really appreciate. The cultural inclusivity aspect. It's just so important for just real world, real life, real people. And then application. Yeah, I

[00:26:16] **Sid:** was going to say just a quick little add on to what Julie was saying is that there's a really high prevalence of binary thinking that goes on when it comes to nutrition.

And I think that that is something we really, we really, as a field sort of need to step away from. And to some extent is not particularly helpful. And more importantly, as we've talked about with this variability, that really creates problems. And so when we talk about the generation of this algorithm, as Julie was indicating we go beyond just the usual suspects, but looking at things like whole grain intake looking at fiber content and so on, the goal is there to holistic view.

What makes a quality carbohydrate rather than it being based off Just one

[00:27:05] **Melissa:** thing. Right. Thank you. Yeah. So before we talk a little bit more about glycemic index, I would like to focus more on what you're saying here, about how we know that the carbohydrate category is diverse and this work that you're doing on the scientific advisory council is hopefully going to help us understand that or how to choose quality carbohydrate containing foods and what they are.

So, can you share how the nutrition science community currently defines carbohydrate quality? We have alluded to it here and there, but I want to make sure that we don't miss anything important with where things are right now with the current definition

[00:27:44] **Julie:** or two things. We already talked about that some people believe it is the glycemic index, which is problematic for many reasons.

In that, for instance, the Sydney glycemic index table, the university of Sydney in Australia has 117 different. Glycemic indices for different kinds of white rights based on its variety, based on the amount of amylose, which is a resistance starch based on not even just whether it's white or brown, this is just white rice, how much water it was cooked with how long it was cooked.

And so most people using a glycemic index table, it's really, really a dartboard, whether the value that you picked had anything to do with what you ate. And then if I buttered the bread, the glycemic index goes way down. In fact, most people don't even know that the glycemic index is based on 50 grams of available carbohydrate.

What that means is that to get 50 grams of available carbohydrate. A refined, enriched white bread. You need about three slices to get 50 grams of available carbohydrate from whole grain bread. You need almost four slices because of the fiber present in the bread. That carbohydrate is not available. So you look at the table and whole grain bread and white bread have a very similar glycemic index, but the amount eaten is different to get the 50 grams of available carbohydrate.

Most. People do not understand that. And that's the reason the Mars bar, it's a little tiny Mars bar compared to almost four slices of whole grain bread having it makes no sense in a way, so that's one problem with it. It's way too simplistic. And it even on the same person, the variability, when we do just a single standard food within a person is great, much less among people.

And so that's really, really problematic,

Before we talk a little bit more about glycemic index, I do want to make sure that we cover where the scientific dialogue around carbohydrate quality is right now, because I know that we've touched on a few things, but what is this current conversation including and not including

[00:31:27] **Sid:** and keep in mind is that the current science, the conversation is largely being driven by a fair amount of epidemiological research, which is fine as a hypothesis building enterprise.

But it's also important to recognize that that's the first step in developing the hierarchy of science and the hierarchy of evidence, which eventually the highest level of evidence would be the randomized control trial or a clinical trial. And so what you have is fairly lower quality evidence that's coming through.

From these epidemiological studies. The other thing also to keep in mind is, as I've alluded to previously, is that foods are, or nutrients are not consumed in isolation. They're consumed as parts of a larger meal and that complicates things considerably. And so a lot of this reductive conversation around single nutrients or single indices really ignores that.

And I think causes a lot of confusion from the perspectives of a patient or a consumer.

[00:32:30] **Julie:** Absolutely. Another problem is that much of the epidemiological research is done with some kind of food intake data, often a food frequency, which asks you how many times did you eat broccoli this week? Or how many times did you eat potatoes this week?

Well, first of all, we're not very good at actually remembering that and data show that we eat more broccoli and drink less gin than we actually do . We do that on a food frequency, but in addition, the food frequency might just say white bread. I already told you that there are hundreds of different glycemic indexes for different kinds of white bread.

So the number that is used in some of this epidemiological research can be very flawed because it doesn't tell you how it was cooked. And as Sid mentioned, what's eaten with it. So that's a really big problem.

So, I mean, I, I've already mentioned this as a certified diabetes educator and working with carbohydrates all the time, I find the glycemic index confusing for patients and just generally not helpful.

So I never really used it. I didn't feel that it had real life applications. When you talk about glycemic index, even versus glycemic load, you've said quite a bit about glycemic index, but I wanted to know if there's anything else that you wanted to point out regarding the limitations of it.

And maybe specifically regarding potatoes and how we don't consume potatoes just by themselves. They're not bananas. We don't just sit there and eat a potato. So what else would you like to add regarding the glycemic index?

Julie: It may be useful in a laboratory setting. It's applicability to a person eating a meal may be very limited.

I absolutely

[00:35:12] **Sid:** agree. In fact, one of the issues with, with the way in which we assess GI is if you look at the standards that are used to establish the glycemic index of a food.

You take only about 10 people, you feed them a portion of the food would contain 50 grams of digestible carbohydrate. You measure the glucose area under the curve and they didn't give them a reference code, which is the glucose or white bread. And that's how you get the glycemic index. This is a really limited sample when you do things like that.

The interesting thing is what happens when you then try and extrapolate this to really large population. So know, in 2015, there was this really excellent study in which they had about 800 people in whom they said about 47,000 different meals. They essentially looked to see what was going on with glycemic responses in these individuals, when you look at the data there, I think it is very telling.

And the reason why I say that is because if you just look at the variability of glycemic responses to things like glucose and bread, you had almost a five fold variation between the one on 10th and the top 10%. So imagine if you had a literal yard stick, but that yard stick, depending on the person that's using it was either one yard or five yards you would look and say, well, that's not a particularly useful yard stick now, is it?

But that's part of the problem. And when you use something like GI, that's really tricky and

[00:36:47] **Melissa:** I'm not the only health professional who seems to feel that the glycemic index is confusing. There was a national survey in 2020 among registered dietitians nearly 800 nutrition professionals that found nearly three quarters do not use the glycemic index when counseling patients.

And three out of five, believe that the glycemic index is actually stopping people from eating perfectly healthy foods. So I'm not alone, I guess, in that opinion. We're not trying to bash the glycemic index here, but we, we really need to look at this more holistically. So we've talked about the problem and the challenge and some of the ideas about how this conversation can, can be more meaningful and holistic.

Is there anything else you wanted to say before We really kind of start sharing some of the, the vision and the recommendations and the ideas moving

[00:37:42] **Julie:** forward? I just the result of one meta analysis, which looked at really a large number of clinical trials and almost 5,000 adults. And there was no consistent benefit of changing the glycemic index of a diet, even in a randomized clinical trial in this large meta analysis.

So I think that shows that the. Randomized clinical trial, which is the gold standard as Sid mentioned, kind of says that what we're seeing in the epidemiological study may be more about what was in the diets that were low-glycemic rather than the glycemic index itself. It may have to do with the characteristics of the individual and the data quality of many of the epi studies, which is probably the reasons that a lot of dietitians don't use it is ranked low to very low, only in the case of lowering hemoglobin A1C, and a couple other glucose measures in an umbrella review.

Was given a moderate Quality, but mostly it's the data quality when it's graded is very, very low, because there is so much variability that

[00:38:59] **Melissa:** makes sense. I'm

[00:39:00] **Sid:** not trying to bash epidemiological research, but one of the things to keep in mind when you're looking at nutrition epidemiology and Julie alluded to this previously is that a lot of this is done based on food-based recalls.

And these are memory-based. The problem is when you actually look at the values you get out of these sort of instruments, you don't get particularly useful numbers and you get incredibly high degrees of variability. In fact studies have

shown that when you look at nutrition recall information say from NHANES, which is a national health and nutrition examination survey close to almost half of the food recall information specifically with regard to caloric intake

Was compatible with someone that might be comatose, but definitely not compatible with someone that's leading a vertical, upright existence. And that's a big problem. And when you look at under and over reporting, almost three fifths of the data are really, really problematic. And so when you look at these epidemiological studies, just recognize that these are meant to generate hypotheses that really should be tested in clinical trials, but you had to be really careful drawing strong conclusions from epidemiological basis.

[00:40:18] **Melissa:** No, thank you for sharing that. We talk about that a lot on the podcast the limitations inherent in nutrition research. How not everything can be a randomized control trial and the role of epi studies. So I appreciate you lending that perspective and reminder for us. because the outputs or the outcomes are only as good as the inputs.

And like you said, a lot of variability there and of course just human nature, memory issues with not being able to be very accurate with that. So thank you for sharing that. I just like

[00:40:49] **Julie:** to add that there are some kinds of things. Glycemic index categorizes as ones we should not choose.

When you do the epi studies, which we've just talked about, whole grains lowers the risk of most diseases in episodic. But what is not reported is that refined grains are neutral. So while they're not as good in terms, they don't lower, it doesn't make them bad. Like some people say, and I think potato suffered from that a little bit too, and they don't recognize that a potato is an excellent source of vitamin C and has more potassium than a banana.

And these kinds of things get lost. When we talk about picking a food by its glycemic response, and then it really, really depends on whether you eat it with fat, which many people do an interesting study for you. And as a diabetes educator is that you got a better overnight glycemic response.

Choosing a high glycemic index potato dish than a low-glycemic index, possum Matti rice. These kinds of things are important to know. And for dietitians to know, because that overnight change in glucose for diabetics must be managed to have a successful person who is a very strict diabetic.

[00:42:43] **Melissa:** I'll just add to that.

When I worked in a high-risk OB clinic, I was shocked to find that it's a pretty unique population, whether it's gestational diabetes or pregnant women with type two or type one diabetes. But especially with gestational diabetes patients, we found, and we encouraged the pregnant women to consume a half a cup of ice cream, like regular ice cream.

At bedtime snack because that perfect mix of carbs and fat helped delay their blood glucose rise. And we saw much better fasting glucose in the morningSo we've talked about how there is a lack of a standardized definition for quality carbohydrates and the glycemic index is flawed or very flawed, but I'd like to hear your perspective in terms of how to best define quality carbohydrates and what is the work that you're currently doing in this area to define quality carbohydrates.

[00:43:59] **Julie:** They were concerned that foods that are important on people's tables that are culturally important and have nourished us for millennia we're being not considered as quality. We realize that there are products, many carbohydrates, snacks, and desserts that should be eaten infrequently, but we really wanted to be able to define what is a quality carbohydrate food.

And we decided that there needed to be at least 40% of the energy coming from. Carbohydrate and that it was a solid food, partly because we know most people know that sugar sweetened beverages are not a quality carbohydrate. They also know that broccoli while it has a little carbohydrate is a quality food.

So we only wanted to focus on those foods. We're solid foods and delivered a significant part of their energy from carbohydrates. And that would be things that often were, as you called them starchy, they would be potatoes, pastas, rices breads and cereals. And then. What do we think is important here?

And we know that people who eat for instance, breakfast cereals have a better nutritional profile than people who don't eat ready to eat breakfast cereals. Bring, how can we capture the nutrients and the fiber that potato brings?

And so we try to set up an algorithm that looked at the nutrients, the fiber, those things that would really give quality, things that we gave negative scores to were the added sugar or added salt so that people could evaluate, well, yes, a cereal may have added sugar.

It may have added salt, but when you look at the entire score, is it something that could rank as quality? And we're finding that a number of foods can have some sugar and some salt and still be considered a quality carbohydrate. And so that's what we're trying to do, and to look at other kinds of tubers and things that are used in a variety of cultures and have always been basic staples in that culture.

That sounds

[00:46:35] **Melissa:** like it makes a lot of sense. Yeah. And

[00:46:39] **Sid:** just to add to what Julie said, one of the main things there was to make sure we considered all the other things that went into these carbohydrate containing foods, fiber, food processing, and so on, because these relate to physiological responses to meals.

They relate to biomarkers such as lipids, blood glucose, insulin, and so on blood pressure, which are related to long-term cardio-metabolic risk. And so that nutrient density that Julie alluded to was particularly important because it can make a mark on these biomarkers, which can then alter a health in the long run as well.

And that's another reason for having a more extensive definition of what constitutes a quality carbohydrate.

[00:47:26] **Julie:** We were even looking at things like phytochemicals and were, were they considered a whole grain or a vegetable because those things would be coming in with the nutrients. So we tried to really look at this in a very globally.

[00:47:39] **Melissa:** Right. It's like its nutrient density 2.0, like there's even more that you're considering such as what the cultural and everything that that's going into this. Oh, by the

[00:47:48] **Julie:** way, protein and fat have degrees of quality already defined and we talk about fats and that we want fats that are unsaturated or we want fats that have omega-threes in them.

And so we've had some degree of differentiation on what we want the fat to have, and we haven't really done that in a organized way with carbohydrate.

[00:48:11] **Melissa:** Right. That's a really good point. And we have something similar with, with protein as well, but we don't have that with carbohydrate. So let's talk about any insights you can share about future nutrition science on carbohydrate quality that we should be on the lookout for as we wrap up, I've got some, some takeaway questions for you.

[00:48:30] **Julie:** I think Sid early on mentioned the dash diet. We know that there are people who abuse carbohydrates. They eat more than the recommended amount for the degree of calories. This contributes to problems that can occur because of too many calories, but I think the carbs are being blamed for it. So I think one of the things that people need to think about is that when we're looking at carbohydrate quality, we need to look at it is it's role in the.

Are people eating the right amount of those carbohydrates as part of the other important balance components of the diet are too many servings of a carbohydrate easing out or squeezing out the important fruits and vegetables so that we can actually want to make sure that the carbohydrates that they're choosing are ones that deliver the nutrients and then help consumers choose the right number of those in a day so that they are balancing it with the other foods that they need.

[00:49:34] **Sid:** So we're engaged in this long-term iterative process in terms of developing this algorithm. And so we only published one manuscript on that, which provided some rationale as to why we were trying to develop a new algorithm for defining carbohydrate quality. We're now in the process of developing that algorithm, and as we've mentioned before, it takes a much more expansive view of carbohydrate containing foods.

And I think our followup is going to be to use the algorithm that is generated and apply in a different dietary patterns across cultures, potentially look at health effects and so on and try to figure out how their turns out. So this is going to be an ongoing process. We're probably not going to get the right answer right away, but hopefully it's a step in the right

[00:50:21] **Melissa:** direction.

And I like that you're bringing multiple parties to the table to kind of have this brain trust. It's not a simple answer. It's complex. See, I did that. Did not mean to do that. So as we're wrapping up, I have a few questions about takeaways. So what would you like the research community to take away from the science around carbohydrates today?

Sid maybe we'll start with you.

[00:50:47] **Sid:** Well, I would primarily say it's just that when you're looking at carbohydrates, avoid reductive binary thinking it depends on context. It depends on the foods that you pair them with. It depends on you in a lot of ways, far too often, the, that aspect is ignored just to use a really simple example.

A lot of people get hung up on the issue of carbohydrates and body, weight or obesity. But what we know from about three or four decades of obesity physiology research is that the majority of the variance in body weight comes from genetics. In fact, the heritability of body weight is equivalent to that of height.

So when we spend so much time talking about this one macronutrient and its association with obesity, we are literally ignoring the forest for the trees, ignoring the elephant in the room and going for a small potatoes. And I don't think it's particularly helpful from a scientific perspective, not to say that don't do research, but I think it would be really careful when we present this research.

And specifically in the way that we talk about it to the consumer or patients or so.

[00:52:00] **Melissa:** Excellent. Thank you for sharing that.

[00:52:02] **Julie:** Well, I would like to see some of the epidemiological studies redone. I would like them to look at the recommended carbohydrate ratio, First of all, look at, are they eating the recommended number of servings?

Is that part of the problem and look at that in relationship to the fruits and vegetables and things that are recommended. So I think we are labeling carbohydrate as bad just as we believed Fat is bad in the hopes we would solve our problems. I think that's a dangerous strategy. I think we need to look at it more in the amount of carbohydrate compared to the amount of other fruits and vegetables, the amount of carbohydrate compared to the amount so that we're looking at more a pattern.

I really like to see a study I would like the grain data to have four buckets instead of whole grains versus refined grains. I would like whole grain staple foods recommended. Whole grain indulgent foods of which there are almost none or were almost none when these studies were done.

There are a few now refined grains recommended foods and refined grain indulgent foods, because I think that will give a different perspective on what we think of refined grains, because half the calories and half the foods, when we look at those data in the refined grain category are non-recommended.

So what we're saying is that those who eat the non-recommended foods have, are at higher risk. And that's what I'd really like people to look at in terms of, for the research.

[00:53:48] **Melissa:** Thank you. And for our listeners, that was a big takeaway from episode 94, that Julie explains in detail that the doodles, ding, dongs and donuts were lumped into.

All refined grains and that has to influence the outcome. Or at least you need to know that when you're looking at what the outcomes are. So along those lines, what advice would each of you share about how healthcare professionals can provide nutrition, education to patients and clients about carbohydrates and carbohydrate foods like potatoes?

My

[00:54:27] **Julie:** go-to paper is that Seidelmann paper where those people who ate half their calories as carbohydrates, and let's make those carbohydrates, potatoes and whole grain breads and enriched, refined grains in the right amount and legumes when they eat those as 50% of their calories. They lived longer than people who did anything else.

And I think that we really need to really concentrate that we are supposed to eat carbohydrates and we didn't, as the paleo people say, we did evolve to eat carbohydrates and there's cave evidence that we did. And so if we look at diets over time, carbohydrates are very important and they're very popular.

So I just think we need. Tell consumers that it's okay to eat carbohydrates. If you, you need to count them if you have diabetes, but you need to include them because they do important things for your diet.

[00:55:31] **Sid**

[00:55:36] **Melissa:** Okay, great. And, and this is pretty similar, so I'm not sure if there would be a different answer to this, but just in general, how can we as a nutrition community, make sure that consumers know which carbohydrate

containing foods are the most nutritious in the highest quality. And that's the work that you're doing now, but any advice there

[00:55:56] **Sid:** that's sort of TBD,

[00:55:58] **Julie:** okay.

The short answer is what are the things The dietary guidelines committee say that we're missing. We don't get enough fiber. And we get over half of our fiber in the diet from grains and potatoes. What are we getting enough of potassium? A potato is a good source of potassium, better than the well-known banana.

So to really think how do we address the dietary disparities that we have? We can do it with inexpensive foods that people really enjoy. And so we, I think need to like reframe that this isn't a bad food. It's one we need to include and we need to include it in the right amount.

[00:56:45] **Melissa:** Absolutely. Thank you.

And then one more nuance to that. Cause I talk about sensational headlines and how they're not the bottom line takeaways that people really need to make meaningful changes in their diets. So whether you're a health professional or a consumer, how can we look past some of these headlines and dig a little deeper when we're trying to figure out this nutrition science or this nutrition research information

[00:57:13] **Sid:** always read the primary source.

One of the biggest problems when you're talking about nutrition research or for that matter, actually that the reporting of science far too often, it's heavily sensationalized. It's not uncommon to read an article that says drinking a glass of red wine. It's just like exercise. And then you, there was actually an article that came out years ago about that, but then when you read it, it was in mice, the, the reserveratrol was the equivalent of drinking, 12 bottles of wine a day.

The problem is that far too often, people are looking for a macronutrient or micronutrient of the day, which is going to quote unquote, change your life or save your life, or what have you. And real life real physiology is a lot more complex than that. And anytime you see a headline that essentially says that pause, read the primary source and more often than not, what you're going to find is that the primary source doesn't quite support the breathless claims that are made in the, in the news report.

[00:58:15] **Melissa:** Thank you. I appreciate how he put all that. I love asking my guests these questions because you get a unique answer with consensus. It's. It's interesting. Julie, anything to add about those pesky

[00:58:26] **Julie:** headlines? Everyone can't always have access the primary source. Just some simple things to be wary of.

Epidemiological data shows association. It is frequently in headlines and in articles as causation, no, that it's an association. The sale of, of running shoes is associated with the rise of obesity. And we know that silly, but both of them happened to climb at the same time. That's what an association is. They just happen to vary together.

So look for that. We know that nutrition like any science is evolutionary, not revolutionary. So if something completely sounds like it doesn't fit the rest of the data, be very careful to evaluate that and try to find other sources. And try to look for sources that are quality sources, ask your dietitian because she or he will be able to help

[00:59:32] **Melissa:** you touched on two or three of the points that I like to make.

And one study is not going to change the existing body of evidence. And you talk about the association as, so the way I like to explain that is the association is a correlation. It's not that cause and effect you use the example of running shoes and obesity. And this is one that I like to use is that sales of ice cream or ice cream consumption and drownings both go up in the summertime in warm weather.

But certainly that's an association that is not a cause and effect. That would be terrible if it was up, but there's a third variable, the warm weather that impacts both of those. So that's something that I like to share when I do my media trainings with health professionals or to encourage them like this is a simple example or analogy that you can share with your patients.

So thank you both for weighing in on the pesky headlines, where can people go for more information related to the latest science on quality carbohydrates? Is there a website that

[01:00:32] **Julie:** you can share? APRE is a good site. The Alliance for potato research and education, and

[01:00:38] **Melissa:** that's apre APR e.org,

[01:00:41] **Julie:** right? And the grains food foundation will have articles about a whole grains and refined grains.

Those are just a couple of a number of websites and I can get you more if you want. Thank

[01:00:53] **Melissa:** you, Julie, Oh and of course there's the Potato Goodness website – PotatoGoodness.com - Potatoes USA's main resource for health professionals. There's recipes, nutrition information, you can sign up for their newsletter and there's a professionals section with materials, research, handouts and news so I'll be sure to have these links and other resources in my shownotes at soundbitesrd.com. And also Sid, you mentioned the first manuscript that is published in nutrients.

And I have a link to that as well as some other articles from the apre site. And I also have some related episodes. In addition to episode 94, with Dr. Julie Miller Jones. I have several grain related episodes some related to diabetes. And I recently did an episode on processed foods. And Julie, when you mentioned that interesting example with oatmeal, how the quick oatmeal versus the steel cut and what was the other one that the old fashioned oatmeal, that's an example of a benefit of processing.

So I encourage people to listen to that episode as well.

[01:01:49] **Sid:** The resource that you might want to add is my former colleague, Glenn Gaesser, Julie, and I wrote another paper which looked at the relationship between. Glycemic index and body weight. That might be something that your listeners might go in and take a look at.

And I'll send you the link to the paper as well.

[01:02:07] **Melissa:** Sid, I actually had Glenn on the show a couple of times, so it might be something that we've touched on, but I definitely want to add that to the show notes.

[01:02:15] **Julie:** And they also might be interested in the university of Sydney international glycemic index table.

And the reason that people might be interested is that it points out so dramatically that if you boil the rice for 12 minutes versus 10 minutes if they,

you get a different amount that basmati rice is tend to be lower glycemic index, but there's some that aren't converted or parboiled rice tend to be lower, but there's some that aren't.

And so I think that really points out quite dramatically, how variable this index is and why using it for advising consumers is really, really, yeah. So not

[01:03:02] **Melissa:** a resource to use, but a resource to illustrate the point that, that we've been making. Thank you both so much for coming on the show and talking all things carbohydrate.

I have learned so much and I hope my listeners have as well. It's been an absolute pleasure. Thank you again for your time. Thanks

[01:03:18] **Julie:** for having always a pleasure and may be happy to talk about fiber and resistant starch sometime. Yeah, we'll have

[01:03:25] **Melissa:** to have you back on for sure. And for everybody listening as always enjoy your food with health in mind and a side of potatoes till next time.

So as you're talking and you're the physiologist kind of a random site, What do you think about fasting cardio? Is that something that you think is

Sid: The interesting thing is for some reason, and I don't know why it's gotten popular, but the important thing to recognize is that when you're fast, really what you're doing is your hepatic, glycogen is depleting or close to depleted, but you still have plenty of carbohydrates stored in your muscle, which is then going to get used up when you exercise.

And so if you track people as they exercise, even after they come in from an overnight quote, unquote fast, you can make them exercise at a higher intensity, their respiratory exchange ratio. Right away and they're oxidizing carbohydrates. So for this idea that somehow this is going to allow you to burn more fat and controlling your body weight in some way, shape or form more so than another form of exercise.

It's probably not

Melissa: true. Okay. Thank you for that little side conversation. I appreciate that.