Your Gut Microbiome And Type 2 Diabetes Management Transcript

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Introduction and Guest Background

Hi everyone. Welcome to the Reversing Type 2 Diabetes Summit. I'm your host, Dr. Beverly Yates ND. And for this session of this episode, we have one of our wonderful sponsors, Pendulum here and there, medical expert Dr. Orville Kolterman.

I'll be interviewing him to get a better perspective about the wonderful things that the Pendulum Products offers for people who have type 2 diabetes pre-diabetes and other kinds of blood sugar regulation concerns.

So, Dr. Kolterman, welcome to this episode. Thank you. All right. We're really glad to have you here. Would you give us just a little overview of your background and your work with Pendulum?

Certainly it's been my pleasure. So I'm an internal medicine doctor, trained as an endocrinologist, have spent my entire professional career working in the area of diabetes with a focus on type 2 diabetes.

You know, I was on the faculty University of Colorado, University of California, San Diego, prior to moving to the biotech industry where I worked with a company, Emlen Pharmaceuticals, developing peptide based drugs for the treatment of metabolic conditions.

We actually were the company that brought the first GLP-1, you know, analog, you know, to market and very Emlen was purchased, it was bought out in 2012 and I thought I was going to retire, but I became bored and was approached by a colleague and Cutcliffe, the CEO of Let's now Pendulum about, you know, diving into the microbiome, which I, you know, agreed to do and spent ten years as a chief medical officer and still enjoying, you know, every, every minute of it.

Now, that's great. I'm glad that Colleen Cutler is the CEO connected with you. You know, your background is so specific and wonderfully rich for exactly what Pendulum's doing in its mission to help people have better glycemic regulation and better blood sugar control and results.

So would you share with us you touched a little bit on that microbiome topic, and we're going to explore it more in depth here because it is central when we think about how the body regulates blood sugar and we promote insulin sensitivity and get better response to the interaction of glucose and insulin.

So the gut metabolic axis, it's an exciting emerging growing area of study. Lots is going on. We know a lot and we're learning even more. Right? I don't know that everything has been discovered.

I doubt that yet.

How the Gut Microbiome Affects Blood Sugar

So how does the gut play a role specifically with metabolic diseases like type 2 diabetes? So there are there are a couple of different ways that, you know, the gut microbiome impacts this.

So with the adoption by our society of the so called Western diet, which is low in fiber, high and refined know carbohydrates overloaded with simple sugars, the dietary fiber has gone missing from that diet and the healthy microbiome, the bacteria that make up a healthy microbiome rely upon those fiber sources as their as their energy supply.

So if you starve the microbiome, the bacteria that live off of those fibers or, you know, diminish in amounts and sometimes you disappear, you know, completely, that has two major.

And I say major because we're learning more and more every day. And I expect that there will be, you know, even more connections that are, you know, worked out over the coming years.

But the two that play critical roles that we know about today are the bacteria, you know, in the microbiome that digest or ferment the dietary fiber produce, short chain fatty acids.

And one of those short chain fatty acids is butyrate, which is important because it's an energy source for the cells that line the islet line line, the intestinal tract.

But it also is a signaling molecule that binds to the cells. You know, in the gut this would be the secrete GLP-1 and you know, GLP-1, you know, as you just pay attention to the lay media today is, is critically involved in the regulation of, you know, metabolism, particularly as it relates to, you know, glucose control and also is is playing a major role in terms of astrocyte control satiety and the maintenance of a healthy weight.

The other, you know, axis that is well worked out, is it a specific bacteria in the microbiome, namely controlling ablation? How embarrassing. Akkermansia You know.

Mucin The failure, you know, maintains the integrity of a mucin layer that lies on top of the inner interstitial or, you know, lining of the gut, and that the cellular lining plus this mucin layer form a barrier that keep in bad actors, you know, that shouldn't get into the bloodstream in in the interior of the gut.

So they pass on through, you know, and out of the body. And if after mentioned become starved, you know, it decreases in amounts. You know, I guess with the butyrate producers decrease akkermansia tends to induce a decrease in if you lose akkermansia his ability to maintain that mucin layer, a so-called leaky gut syndrome, you know, eyeballs.

And what that means is that things it shouldn't get into the into the bloodstream, get across and get into the bloodstream, various toxins and what have you.

And those substances create inflammation throughout the body. And as it relates to implementation, it's become clear over the last five or six years that that generalized inflammation plays a significant role in driving insulin resistance, you know, throughout the body.

Makes sense, right? All of these things are so interrelated. You know, I've always thought that the good news is find a key area or two to focus on and you'll get benefits systemically.

But we always have to be able to plant our flag and get some results. Right. So what are the two main dysfunctions that occur for the gut microbiome of people who are living with type two diabetes?

And how is that related to missing bacterial strains? So you mentioned the fact that there are strains in the in the healthy microbiome that ferment the dietary fiber and produce these short chain fatty acids.

You know, and again, as it relates to metabolic diseases, beta eight is, you know, particularly important.

GLP-1, Satiety, and Cravings

So, you know, in almost anyone that has components of the metabolic syndrome, multiple studies have shown that that there is a deficiency of the beta eight producers, you know, in the in the microbiome.

And then in parallel, as I mentioned earlier, there tends to be a decrease in occur. Mantia Which sort of, you know, it akkermansia here, this actual role is that it's sort of it digest damage.

Mucin Which interestingly by akkermansia digesting that damages mucin and actually stimulates the formation of new, you know, healthy mucin by increasing number of missing potentially producing cells in the lining of the gut.

And so those are, you know, two things that that happen that are play a very significant role as it relates to metabolic syndrome and, you know, type 2 diabetes in particular.

Absolutely. These things are really important. Now, you remember in the 90's there were some research that come out around the importance of Butyrate and the role of butyric acid and what goes on for the gut and the gut lining.

And then people talked about the interstitial permeability of the cell lining and then, you know, they it became more popularized as leaky gut syndrome.

And now here we are full circle with understanding the impacts specifically on blood sugar regulation. I think this is a very fertile area of continued growth in research and understanding, and I'm really glad for the kinds of products the Pendulum has because it makes a tangible, provable, objective difference for people's.

But you're. Right. Okay, so then how does this gut metabolism access, regulate this glucose metabolism, and what role does GLP-1 play in this process?

GLP-1 is something that people are starting to hear more and more about, whether it's commercial drugs like Mozambique or Monteiro that bound, etc. You know, what role does it play here?

And then can we optimize GLP- production through the gut microbiome in a natural way. Yeah. So GLP-1 is what's known as an inverted form, which means that you know, it it's stimulated by the ingestion of food and it augments insulin secretion.

And so if GLP-1 production falters or lags behind, you know, there's not an adequate production of, you know, insulin which is key to regulating your blood sugar control.

The GOP one is actually sort of a so amazing, you know, peptide, which not only does it impact insulin secretion, but it also impacts the rate at which the food moves through the stomach.

And it like to think of it as it turns the stomach into or maintains the stomach as a reservoir that holds food. And instead of just dumping it all into the small intestine for absorption at once, it sort of trickles it in, you know, over, you know, over over time.

So that's another contributing factor to, you know, improving metabolic control. And then it also works, you know, centrally, you know, in the brain. It turns out that even bigger impacts.

So there are two parts of this. One is, is that guilty? One that makes it into the bloodstream can actually enter the brain. I mean, I learned in medical school that there was his blood brain barrier that nothing got across.

Well, you know. I did do. Well, you know, back in your days and ambling the you know where you came to understand that the in the brainstem there's this area of Extrema that has a finisterre straight blood brain barrier which means that it actually has holes in it, that peptides of certain sizes, you know, can get across and they cross over into the area of stream of which is rich in GOP one receptors.

And it then plays a major role in satiety by virtue of what happens in the area of stream triggers, a whole network of neural circuits, you know, in in the brain, all of which are you know, impacting your appetite, control, satiety.

And there's still a lot to be learned about that. I mean, you know, it's it's really the knowledge level there is is really exploding right now and something that I think is equally important.

And it ties back into how the microbiome can influence is is that it's big. It's we now know that there are nerve endings in the lining of the gut that have GLP one receptors.

So JLP one that is secreted locally can interact with those receptors. Those receptors triggers sugar signals that travel up, you know, that those nerve endings up to enter the vagus nerve, which is a sort of a superhighway, you

know, directly to the brain.

And, you know, again, it when it when those signals get to the you know, to the you know, to the I guess, the tollbooth, if you will, going into the brain, they sort of trigger a number of signals that, again, fan out and the impact, you know, various satiety centers.

And so that means that you'll be one as having two different, you know, lines of attack, you know, if you will all, you know, trigger, you know, all directed and improving metabolic control satiety and, you know, you know, weight control.

Those are important relationships. I think that one of the things I've heard people commonly express, they talk about food noise or they can't stop thinking or obsessing about food, or they feel like they're never full, that they're always hungry, things like that.

It's clear that this GLP one peptide relationship in the body makes a huge difference to whether or not someone can be at peace with food or if they're just going to struggle.

And so whatever we can do to help promote that GLP one functionality is going to be a good thing for human health. It's it's a place where we have to win because we see the profound metabolic changes happening for people.

So many more people with pre-diabetes, type two diabetes type pre-diabetes, which is what affects the brain and dementia and Alzheimer's, type one diabetes, showing up in adults, you know, type 1.5.

Wow. You know, this is just a moment in human history. We have got to have more answers. So I appreciate you explaining this. I really do. So another aspect of that that I think is going to be really big is that you mentioned people making peace with food.

There's some very intriguing, you know, literature, you know, evolving as we speak, showing that the guilty one, you know, impacts the not only satiety centers, but the sort of the cravings, you know, centers of the brain.

And me, it goes across nicotine, alcohol, you know, even even hard drugs.

Probiotics, Prebiotics, and Pendulum's Approach

So I think those are those are going to be very, you know, rewarding areas, you know, in the near future. And, you know, this was a pendulum. We're very pleased to see that studies are showing that after Mantia also, you know, impacts, you know, cravings.

We've just done a is completed a study, you know, with akkermansia, you know, where people were provided with with eczema and sia and, you know, using the state of the art questionnaires to assess food cravings.

We you know, the data show that food cravings decreased in over 90% of people. And interestingly or importantly, I think that the stronger the food cravings were at baseline, the greater the impact of the of the akkermansia.

That's great. I'm a I'm a fan of giving people control over their life human agency and they can make good decisions and not constantly be at war with themselves because that's kind of what it seems like it is for the person who has the issue.

Which is, you know, one of the sets of questions in that questionnaire actually target you, you know, fast food and, you know, demonstrate that there was an impact on people's desire or drive to stop by the McDonald's on the way home.

You know, which certainly is a is a help is a health positive step forward There. Definitely highly processed, ultra refined food is never, never a good thing for human health.

Yeah, that that statement. Stand alone. Okay. All right. So now that we have this context, we're talking about the gut microbiome and optimizing GLP one production, helping people to make peace with food and to be able to have a real tool around success with battling cravings and making good food choices and wanting to do it right.

Because once a person turns that order, they tend to stay there, which is great news, right? So is there evidence for the use of probiotics and prebiotics in glucose management for individuals who have type two diabetes?

So the good news is that, yes, yes, there is. You know, some of the you know, traditional probiotics have been shown to have some impact. But even with glucose control, these are things like lactobacillus and, you know, develop bacteria that, you know, the founders and and Colleen and her and her colleagues actually have a background in, you know, sequencing and DNA sequencing.

And that's the technology that sort of opened up the microbiome in doing their sequencing work in their former life. They noticed that there were certain patterns of changes in the microbiome that were associated with type two diabetes.

And, you know, there were other investigators that were making similar observations, or at least in the literature. And again, it points to, I guess the the thing that sets a pendulum apart is that, you know, lactobacillus, bifidobacterium are bacteria that can grow in the presence of oxygen.

But there are a number of Keystone Keystone strains, really key players in the microbiome. And it turns out that those are the ones that ferment the fiber actually are anaerobic bacteria, meaning that they they they cannot tolerate the presence of oxygen when they are, you know, they're actively metabolizing.

But historically, those are bacteria that have been not leveraged for any kind of use because such a challenge to, you know, to grow them. So anyway, Colleen, your colleagues noticed that as bacteria were decreased in patients with type two diabetes.

And so we use that data to sort of target, you know, a, if you will, a sweet formulation, no pun intended, that would target, you know, the efficiencies that we've seen.

And those deficiencies were, you know, the ability to to, you know, ferment fiber and produce butyrate. So, you know, the formulation is three different butyrate producing organisms, you know, in it.

And then also in metabolic syndrome, as you touched on several times in this conversation after Mantia, you know, is decreased. So, you know, we were able to develop a across just by which you could grow, you know, after Mantia successfully And then all of these strains as launched, once they're grown, they're if they're grown in the absence of oxygen and you then freeze dry them, they are stable, you know, in the presence of oxygen until they become, you know, rehydrated.

So you're able to make a powder formulate, you know, a probiotic strain of the capsule, and then it's available, you know, for people to use. And we conducted a study in patients with type two diabetes, all of whom were using the common drug metformin.

And we demonstrated that the introduction of this was five strain formulation that's now known as penicillin. With those control led to significant improvement in, you know, in terms of glucose homeostasis.

And there's also some evidence emerging that it's probably also beneficial in terms of managing and controlling lipids. It makes sense. These things all go together. They're hand-in-hand.

Many people who have type two diabetes also have unhealthy, unfriendly cholesterol profiles. And so being able to get multiple benefits is always going to be good news, right?

That makes sense. Absolutely. Okay. So from a nutritional standpoint, is there anything that individuals diabetes can do to improve the state of their gut microbiome?

So it turns out that the meal, the general recommendations that nutritionist have been making for years are, you know, the ones that are beneficial for type two diabetes or for patients with type two diabetes.

The challenge has been is that you know, that that diet, you know, tends to be rich in fiber, you know, insoluble fiber. It you know, it it you know, things like, you know, nuts, you know, berries, green, leafy vegetables, all things that are, you know, have a good fiber content.

You know, the right kind of fiber to feed the microbiome have been recommended. But the problem has been is that the other half of the of the team has been missing and that these the deficiencies in the microbiome.

Diet, Future Trends, and Prevention

So if you put those dietary recommendations together with replenishing the microbes in the microbiome, you sort of, as I like to say, get the whole loaf, you know, you get both of them the diet, and then you also are getting the benefit of replenishing the players that can make maximal use of that dietary fiber to replace the processes that we've been talking about so far.

Okay. So then getting the full benefit and helping to restore the integrity of the gut's lining the mucin production, getting better balance and sensitivity responses, if you will, to the protection of GOP one peptides in the body and having them do that goodness that gives people at peace with food, reducing cravings, you know, along with benefiting their blood sugar.

The direct thing that we're after. But there's all these other remaining things I benefits are there are other things that you'd like to share that have to do with the science and evidence for the use of a symbiotic formulation to improve gut health and assist with glycemic management, you know, blood sugar control in people with type two diabetes.

And so the the term symbiotic means that it's a combination of a probiotic along with a prebiotic or in this case a fiber source that the bacteria live all over use as a as an energy source.

So you and glucose control, for example, has, you know, contains inulin, which is a fiber that the bacteria you know, you know, these bacteria love to, you know, to chew on and get their energy from, you know in inulin comes from Jerusalem artichokes and also if you live in the south and are familiar with having chicory, you know, added to the coffee, chicory root is another, you know, good source of a inulin.

That's good to know. I was recently traveling in New Orleans, in Louisiana, and I was enjoying having chicory and it was available a lot of beverages.

So I've always enjoyed that particular urban. You just give me one more reason. All right, great. So as we look towards wrapping up our interview, I wonder what your thoughts might be about the future trends that might be coming and things people should be looking for.

I know that Pendulum as a company is a leader and is looking to grow the audience and is also looking to grow the impact. We're all linked together. My own personal goal is to help 3 million or more people reverse type 2 diabetes, because I know the trickle down effects will be amazing if we're able to accomplish that.

So as you know, a working team, we're all going towards the same goal, which is helping people to be healthier and to have their health span equal their life span, because a lot of people, they're living longer, but they're not living better.

And so I really feel like we got to close some gaps here around metabolic health and type 2 diabetes would be right in the bull's eye of that whole thing.

What are your thoughts about things that are you're either working on as a company or coming trends that you see since you have such a long background in this work?

Well, so type 2 diabetes, you know, is a very significant issue. But you know, the precursor to type 2 diabetes, you know, pre-diabetes is which there are millions of Americans that are, you know, afflicted with the disorder, many not aware that they, you know, you have the every issue.

But I think being able to spread these approaches that we've been talking about out into the population as a as a preventive measure as opposed to being, you know, reacting to a disease state once it's established, you know, it is is going to be true to be very important, particularly amongst our young people.

You know, many in the audience will be aware that there's an epidemic of type 2 diabetes in adolescence. You know, you know, these days. And, you know, we've been seeing that now for about a decade.

And it's been long enough that they're the data is emerging that show that that type 2 diabetes emerging at that young age is particularly devastating.

You know, in terms of, if anything, those young individuals are seem to be more susceptible to the chronic, you know, complications, particularly the cardiovascular disease.

So if we don't do something about that, we're going to be see, we're going to see people with having significant heart attacks that date before the age of 30, which is just, you know, frightening.

So and then, as you said, Dr. Yates, and multiple times, that this is all, you know, connected together. I think, you know, we're going to see that, particularly as it relates to neurodegenerative diseases, Parkinson's disease, Alzheimer's, that multiple sclerosis, that these things that we've been talking about are are going to be shown or are being shown to have a major impact upon, you know, Neural Health in, you know, mitigating some of those neuro neurodegenerative complications.

Yeah, I agree with you. I absolutely agree with you that the goals I mean, I see it coming right down the pike because, again, these things are related the same way you can help to heal something and make it better.

You can also masturbate it, make it worse. You know, it's a seesaw thing. This relationship. I think the more we can talk with people and get the word out and educate them via Summits, things that we do on LinkedIn or other places, social media, YouTube, however, we're reaching folks.

We have got to get the word out because otherwise our young people are going to suffer and they're going to suffer seriously. They're going to have really crummy adult lives if they even live that long.

I mean, it doesn't make sense for our health progress to go backwards so sharply. But that's exactly what we're seeing in real time. So we need to have effective answers in real time to meet the moment and make this better.

We really appreciate what you're doing to help get the word out. That's a that's a very, very, very important. Thank you so much. I appreciate your kind words and being a sponsor and being with us here on this journey very much.

All right, friends, so please share this episode, share other episodes that you watch with people that you know that you care about. We really are trying to impact people's lives and make a positive difference in a chronic disease that is so very sensitive to lifestyle.

All right, everyone, thank you so much for being a part of this episode. Thank you.