SIBO Testing

Is It Time for a Change in Protocol

with Jason Hawrelak

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Shivan Sarna: Hi everyone, I am Shivan Sarna. I am the founder of SIBO SOS® and the author of Healing SIBO. And I am here with Dr. Jason Hawrelak and Dr. Allison Siebecker, both world-renowned experts in the field of SIBO and the microbiome.

And they have a very interesting situation that they wanted to share. And I'm so glad to be part of this conversation. So, I'm going to actually hand things over to Dr. Allison Siebecker so she can tell you about why this conversation came to be and why she was so particularly so excited about it.

Hi Dr. Siebecker!

Dr. Allison Siebecker: Hello! Well, many, many years ago, I had asked Jason if he could let me know what he was seeing in the differences between glucose breath testing and lactulose breath testing because he did both on his patients… which is amazing! I didn't. I only did lactulose. And I knew he liked glucose. And I didn't want to be missing anything.

It turns out that, recently, he prepared for a presentation some data and actually had triple breath testing. He reached out to me to let me know he's got some amazing results. And I was so excited in hearing your results, Jason, that we wanted to just get it to everybody because it was a presentation in an industry conference and not everyone got to hear it—even including myself. I didn't get to hear the presentation because I was also presenting at the same time.

So that's really how it came to be. Jason remembered my question. And he wanted to provide me with really good data being a researcher—Jason is a researcher. And he has that information now.

[01:54] SIBO Testing: Is It Time for a Change in Protocol?

Dr. Allison Siebecker: So Jason, why don't you give us your background on this?

Dr. Jason Hawrelak: Thank you. And I apologize it took some years to actually get the data. I just didn't want to do it. I was confident with the findings.

I'll tell more by the presentation. But really, I was trying to work out the best way of diagnosing SIBO. We know there's conflicting information in that North America is very lactulose-biased for lack of a better word. You heard Allison was very glucose-biased. And for me, I was like, "Well, I'm going to do both, two things." But then I started seeing some other interesting patterns with fructose. And that's what we'll get into this presentation and discussion afterwards.

Dr. Allison Siebecker: Perfect! So if you want to just start. Share your screen...

Dr. Jason Hawrelak: Yeah, I will do that. Right! So hopefully, you can see the screen. Okay, great! I'll get into it, and we'll have some time for questions afterwards.

So, for me, it was me asking: "Is it time a change in protocol around SIBO testing?" And I want to place this argument within the context of a patient story because I think this illustrates it quite well, why this is so important.

So the case...

This is a 35-year old male. Primary complaint: frequent belching, but also diarrhea.

And I always think that we always have to dig in deep with that term "diarrhea" because it means so many different things to different people. For this person, it was four bowel movements per day, type 6 stools in the Bristol Stool Scale. Definitely diarrhea (but I've certainly had patients who do one type 5 stool a day and classifies

it as diarrhea. It's like… it's not. So we have to dig into it… definitely in this case)—often greasy and pale mucus, explosive and urgent at times.

Episodic bloating, episodic abdominal cramps; what he describes as "smelly flatulence"; and gut symptoms were worse with white flour products, sweet and many fruits—not all, but many fruits.

And plus, there were systemic symptoms like brain fog, fatigue, low mood and anxiety.

So the patient presentation is pretty familiar to many of us living in the world of SIBO.

So, let's go back a bit further. He had a 13-year history of gut issues. And it started with increased bowel movement frequency and an abundance of what he defined as foul-smelling flatulence and stools. But there's no obvious initiating event. For many people, there's travelers' diarrhea or food poisoning, or even a course of antibiotics that they see as the turning point moment. But there wasn't with this patient.

Now, the first investigation that was done 13 years ago was a test for parasites. And that found blastocystis. And then, from that point, he went to see a naturopath doc in 2005. And that was actually with me, a less hairy and less grey version of me and a lot less experienced […]

I didn't do any further diagnostic testing with this patient. I was like, "Okay, you've got symptoms that sound like it could be caused by the blastocystis. Let's just focus on killing that." So, we did a blastocystis herbal protocol and probiotics for six weeks.

Did we see some improvement? Yeah, there was certainly some temporary reprieve.

And then, right after that, I moved intra-state. We haven't been in touch. And then, seriously, 13 years later, I come in contact with this same patient again with the same

presentation, the same symptoms. I was like, "Wow! Here is an opportunity to do a re-do." And you don't often get that in life, a chance to re-do something to see if you can do it much better. I'd like to think that I cured him 13 years later. And I think we did. But it certainly had a lot to do with diagnostic work-up (me and a lot of other practitioners over the years that were seeing SIBO were quite lazy in terms of diagnostic work-ups).

So, relevant family history… the brother and daughter were recently diagnosed with Celiac disease. And the father had a long history of GERD. And the reason I kind of flagged the GERD is that some people with Celiac, one of the main presenting complaints is GERDS. It's not supper common, but it still is. And it's often unresponsive to typical treatments. That should be a red flag for us there.

Previous investigations… just a lot of stool tests showing blasto. That was all that was done for 10 years after I saw him. Stool test after blasto, they tried to kill it. Test again. Kill. Test. Kill. Test… with not much changed.

But after his family was diagnosed, he went, "Oh! Let's get serology done." He had normal antibody levels, but he hadn't actually been eating gluten when he got the test. And this is again another of those things that drive clinicians crazy. There's no point in doing the test if you haven't gorged in gluten for six weeks leading up to it. It's not going to be accurate.

Gene test, positive for genes not surprisingly for Celiac. And that was more recently after a family member was diagnosed. A new clinician had started to do a bit of a deeper work-up… which was great! It gave us some additional data we didn't see before.

Now, previous treatments were all really based on trying to kill the blastocystis… lots of Flagyl (sometimes with short-term relief). He was essentially a decade on herbal antimicrobials and probiotics off and on (mostly on for that decade).

2012, there's a place in Sydney here in Australia called the Centre for Digestive Diseases that really focuses on antibiotic cocktails to try to eradicate things like blastocystis. He did that which is a pretty full-on triple antibiotic cocktail. He felt horrible during. He had some short-term improvement on symptoms afterwards. But again, short-term has to be the thing that runs through this case.

He's currently following an anti-Candida diet. And yes, signs and symptoms were significantly better when he followed the diet. So when he wouldn't eat the white flour products, he wouldn't eat most fruits, he wouldn't eat sugary things, symptoms were generally much reduced—not gone, but much reduced.

But nobody did much in the way of investigation except for a follow-up parasite test. That's it! Until very recently…

So, here was my chance of going, okay, seeing this person again, I didn't do a very good diagnostic work-up at all when I first saw him back in 2005, here's my chance to do better.

So, what we did… SIBO is always at the top of this. Now, I can forgive myself a bit, my 2005 self, because SIBO wasn't really talked about much in 2005. It's just barely out there in the literature. Breath testing wasn't really talked about. So I can give myself a bit of forgiveness for not looking at SIBO back then.

Celiac disease is obviously going to be on there; along with gluten sensitivity; fructose intolerance because he seems to be reactive to fruits specifically; inflammatory bowel disease (because of the diarrhea, we should always check for); and I've put two at the bottom, blastocystis infection (over the last 15 years, I looked at blastocystis quite differently than I did in 2005. And I think the literature has come out that, for many people, it's normal and commensal and potentially a beneficial member of the gut. So we shouldn't necessarily always assume it is the cause when present with some of these gut symptoms. So for me, it's almost a diagnosis of

exclusion if you've ruled everything else first, and then it's there... yeah, I'll think of it a bit more); as is diarrhea-prone IBS (it's kind of like, "Well, we don't know why you've got diarrhea. We'll label it "IBS." But we need to check things like SIBO first obviously and things like fructose intolerance in a case like this).

Investigations: breath testing (glucose, lactulose and fructose), a leaky gut test, and also fecal calprotectin looking for inflammatory bowel disease.

But I think the breath testing protocol there is interesting. Like we were saying at the very beginning, we're looking at glucose and lactulose. It's kind of the standard thing I was doing for my SIBO patients. But over the years—and I'll get to the reason why—I started adding in fructose to this standard testing regime as well.

So, let's look at the results: normal intestinal permeability, low fecal calprotectin. So that kind of rules out some of the things that were on that list.

Now, from a breath test result perspective... here, we've got the lactulose breath test here. And essentially, it's not positive. It's negative. There might be a slight leap at the 100-minute mark where it bumps to 75ppm, but it's not anywhere near the 120-minute cut-off.

But here, if we look at the glucose result, we can actually see at the 30-minute mark that it's positive.

And then, on the fructose test, look at that, we had a 100ppm increase at the 40-minute mark.

And this pattern of really extreme breath gas result on fructose is really common in my SIBO patients.

And the key thing here is noting the time at which the bias occurs with the fructose. It's happening at that 20- and 40-minute mark where you see each rise. That is small

intestinal. That's not colon. That's small intestine—just like we'd see that rise at a similar time point with the glucose test. But again, we don't see that rise on the lactulose with this patient.

If I'd only used lactulose as my sole sugar, I would've actually missed SIBO in this patient. And he may have been mis-diagnosed once again (as he had been for the last 13 years). The treatment would've gone down a different path than it actually did.

So, for me, after getting the breath test results in, hydrogen-dominant SIBO with secondary fructose intolerance.

And the term "secondary fructose intolerance" isn't used much in medical literature, but it fits this scenario beautifully because we treat that, we treat the SIBO, and they no longer have fructose intolerance.

And this differentiates from the classic fructose intolerance where the rise of gases is in the colon. And they're kind of is in a lifelong low fructose diet. You can't just treat it with some herbs, and it goes away. But we can when it's actually SIBO-induced fructose intolerance.

And yes, I think he's probably got Celiac as well, but we need to do a gluten binge challenge and then a follow-up biopsy and things like that. So we'll leave that aside for the moment.

And I think he had symptomatic improvement previously each time he took certain antimicrobials because it was inadvertently targeting the SIBO. But just because the herbs weren't necessarily put together quite like for targeting SIBO, and there's no maintenance strategies put in place to prevent it from coming back, it would always just come back in this patient.

But now that we know that it is, we can get much better treatment outcomes from it.

[12:10] Breath Test Interpretation

Dr. Jason Hawrelak: Now, I'm going to whip thorough this, the breath test interpretation because most people are going to be up on this. But I just wanted to flag it for those people. We're going to look at a few different test results for some people that don't look at breath test results all day every day like Allison and myself.

And I think part of it is this fighting too. Pre-2017, it's just like cowboy country where different labs had completely different interpretation guidelines. Some labs were using 3ppm for methane positive, and some labs were using any rise of 12 or 15ppm for hydrogen at the 3-hour mark as positive. So, I love this stuff in 2017 where they tried to standardize this a bit more. We're looking at that 20ppm on lactulose and glucose; methane, 10ppm at any time point.

I'll probably move through this relatively quickly. I just wanted to flag that, one, what the cut-off's were. And even in the UK, they see things a little bit differently in that they're using a 10ppm hydrogen rise at the 60-minute mark rather than 90. And if they see any rise between 60 to 90 minutes, you've got to have some clinical judgment in that. Could that be in the colon, or is it still in the small bowel at that point?

And then, obviously, they changed the name from our old SIBO-methane into intestinal methanogen overgrowth (IMO) because they obviously occur in the colon as well, and they aren't bacteria… which is all very true.

[13:37] Triple Breath Testing

Dr. Jason Hawrelak: So essentially, my approach to SIBO breath testing is this. Lactulose and glucose all makes sense from the literature. As we talked about in the

very beginning, in Europe, they're often using glucose, recommending glucose. And in North America, we're often using and recommending lactulose—and sometimes, exclusively in both. Here in Australia, we try to grab the best of both worlds and be like, "Let's do both!"

But what we started seeing is this. So the top graph here is what fructose intolerance is supposed to look like. So just the fructose, you have no rise until that fructose reaches the colon. And there you see this expansion in hydrogen at that point (or it could be methane. But in this case, we see hydrogen). So that's what it's supposed to look like. That's what all the papers on fructose intolerance talk about.

How often do I see this in my patients? Always never. I had to search and search my files to find this first graph.

What I see in my patients is this, the bottom diagram, in almost all my patients. We see this massive spike in breath gases at an early time point. At the 30- to 60-minute mark, we see that giant spike.

And this just blew my mind at the time. I'm like, "That's not what's supposed to be going on." Fructose intolerance, according to old literature, is this colonic fermentation. And what we're seeing is small bowel fermentation… and also, this exaggerated breath result in terms of, often, the 100 to 200 mark of parts per million breath gases.

And sometimes, I'll notice that fructose would pick things up that glucose and lactulose did not. So that sort of made me go, "Oh, gosh! That's interesting. I'm going to start doing this with everybody." All my patients will now get lactulose, glucose and fructose, so we have the best chance of seeing it. And then, hopefully, eventually, I'll get enough data that I can do something more formal with it—which is what occurred recently.

So, let's look through some examples of breath test results that kind of formulated my approach.

Here, we have a patient where the lactulose, it's essentially a flatline. There's not much rise up at the 2- or 3-hour mark—a little bit, but that's really not much.

Glucose, nothing to see there. Maybe there's like a nick there, but again, not quite close enough to the positive cut-off criteria.

But here, look at that with the fructose. We see this massive spike in gas at that early time window once again.

Another test result where, again, it kind of flatlines. Glucose, again, nothing to see here. And here, again, we see going on for this less exaggerated response this time. It just creeps over that sort of mixed SIBO kind of 50ppm cut-off. But there's dramatically more symptoms from the fructose as well. But again, it's at an early time window, not later on in the colon […]

So essentially, for a presentation I was doing recently, and to help answer Allison's questions (at last!), I decided to go, "I'm going to take the last 130 patients that we've done this triple sugar breath test on to work out what the results were." Were the sugars equally delivered, was it particularly better than the others, et cetera…? And here are the results in graphical form. I'll walk you through it. Between this and the next slide, it'll probably all come together.

But all three were negative in 15 patients. So there was no rise in any of the three sugars. I had to find them as being negative. So 15 out of 130, SIBO is not there.

But what's interesting is that 60 out of 130, all three gases were positive. So, if we were doing any of the sugars, it would've showed up. That's a pretty decent amount.

But what I think is more telling here is that lactulose picked up SIBO in eight occasions that the other sugars missed—only eight occasions. Fructose picked it up 19 occasions that the other two sugars missed. Glucose, only four… four times.

I started thinking what happens with fructose in the gut. Glucose, we know its main limitation is that it's actively absorbed in the upper small intestine. So, if you have SIBO in the upper small bowel, yeah, it's usually a pretty accurate sugar. But because your body so avidly grabbed it, there's no glucose left in the middle to the last bit of the small bowel… which is the main concern with using glucose.

Now, lactulose, it is not absorbed. So it first goes to the small bowel, middle bit, last bit… it's still there. But the issue with lactulose is that it's only selectively fermented. Not all bacteria has got the machinery to eat it. So they can be there in large amounts in the small bowel, but you won't see it on a lactulose test result.

They eat glucose. But I think that what happens with fructose is that fructose is almost universally consumed by bacteria. And it is slowly absorbed. So unlike glucose where it's avid, we know fructose is a carrier-mediated or facilitated diffusion. That's the technical term. But it means it's slow… slow absorption rather than quick. And it means that it's there in the middle of the small bowel. And I assume it's probably there, at least to some degree, in the last bit of the small bowel too. But it feeds a broader range of microbes. I think that's why it's actually so good at picking up SIBO cases. It's kind of got the best of both worlds from the glucose and the lactulose. That's my theory anyway to explain the results.

And I think this next table hopefully makes it pretty clear too.

With these patients, 115 out of 130 I would say is positive because one of the sugars was positive. If I've done lactulose only, I would've picked up the SIBO or IMO 73% of the time, 73%. And that kind of correlates with some of the data we have in terms of

comparing it with the so-called gold standard of aspirate culture (which we know has got some issues with it for sure).

Fructose only would've picked it up 85% of the time if I had only done that one thing; and glucose, only 67% of the time.

And when I used to do, just combining the lactulose and glucose, it doesn't actually increase diagnostic yield much... 76.5% versus lactulose alone which is 73%. So it's not really probably worth doing it than just doing the glucose only.

But if we just did glucose and fructose, we pick it up 93% of the time; or even better, lactulose and fructose, 96.5% of the time.

And certainly since I've correlated the data together, that's what I've been doing with my patients. I've actually dropped glucose from the mix. There's a small drop in diagnostic accuracy arguably from 100% down to 96.5%. But it's an extra cost. It's an extra hassle, doing it. And it's a few more days, potentially a week, before you get your results in as well. So for that slight decrease in diagnostic yield, I don't think it's worth the expense. I've shifted since I've put this data together to working on just using lactulose and fructose based on that. And that's probably the bulk of the data that I want to share.

Now, obviously, there's some caveats here. I wish that I had access to the gold standard small bowel aspirate culture so we can do some sort of correlative data around that. I don't. I'm a clinician, I'm a researcher, but I don't have access to that type of equipment. So that is a limitation.

But what I found with these people that have that SIBO picked up on fructose, you treat the SIBO, and they can eat apples and pears and mangoes and watermelon and cherries again... which is not the case when it's a classic fructose intolerance where you get that rise in the colon.

I'm open to questions, any discussions. That's essentially it.

Dr. Allison Siebecker: Wow, wow... wow!

Shivan Sarna: We were like on the edge of our seats waiting for more brilliance. You just keep topping yourself. That was fantastic! Thank you so much. How is the patient now?

Dr. Jason Hawrelak: Listen, there's still ongoing stuff we're trying to tease out, but he's much better for the first little bit after that treatment. I still think we should work on the Celiac component of that. There are some interesting aspects to this case in terms of low fecal elastase. He has other things that fit the Celiac picture.

Shivan Sarna: Very cool, very cool! Dr. Siebecker, what questions do you have?

Dr. Allison Siebecker: I have a bunch! This is just absolutely amazing. I was just smiling the whole way through.

[22:09] Breath Testing with Fructose

Dr. Allison Siebecker: Okay, my first question would be... for people who might feel unsure to start using fructose just based on that data (just because they haven't done it), can you put our minds at ease that you're seeing good clinical correlation. So the people you're picking up on fructose who you didn't pick up on the other tests, you're treating them for SIBO, and you're seeing improvement?

Dr. Jason Hawrelak: Yes, definitely, yeah. And that was the case further on in that—

And it's funny... I remember this one patient who have had a 10-year diagnosis of fructose intolerance. She comes to me. And she had a breath test she did 10 years prior. I said, "Can I see your breath test result?" She had been suffering with ongoing

symptoms despite going on a low fructose, low FODMAP diet about that time 10 years ago, some ongoing symptoms (it was better, but not that much improved). We looked at the breath test result, and it's like, "That's SIBO!" It was like this huge spike at the early window. "Here, let's treat the SIBO," and she could eat all those foods again.

And that case just illustrates it so beautifully because she was kind of—not mis-diagnosed, but probably over-worked. There was an over-description that occurred being labeled as fructose intolerant. She was… they just weren't treating the cause. The cause was SIBO. You treat that. And then, all of a sudden, people's diets open up and they get a whole bunch of other symptoms improved in a way.

So yes, definitely, I'm seeing that, that clinical correlation.

And I'm suspecting SIBO in these patients as well. It's just that I wasn't finding that lactulose, interestingly, enough picks it up, whereas fructose did in a lot of patients.

[23:44] Breath Testing with Lactulose

Dr. Allison Siebecker: Actually, on that note, I know you have said in the past it's mainly proteobacteria that don't ferment lactulose. What are some of the names of those proteobacteria? Are we familiar with them?

Dr. Jason Hawrelak: Yes, so that would be things like E. coli, klebsiella, citrobacter, haemophilus. They're common gram-negative bacteria that don't really ferment lactulose.

And this is the interesting thing for me. I started doing research in irritable bowel syndrome back in the 2000s. And I was treating more IBS patients with lactulose as a prebiotic, as a substance to feed up good bacteria. And then, someone came up with this idea of using it as a breath test. I'm like, "We could just be testing for good

bacteria in the gut." It just kind of blew my mind because all the research before that was often around its prebiotic qualities. It used to be added to infant formulae as a prebiotic sugar back in the 1950s and '60s.

There's a lot of data on how selectively it's fermented. That's always been my limitation or distress with just lactulose. It's like, "I know it's not going to feed some bugs that can be there."

We know from the research—and we've got better research now that look at samplings from the small bowel to see what bugs are there. But even that previous research found gram-negative bacteria and things like bacteroidetes being present. And those things don't eat lactulose for the most part (with the odd exception). So, it made sense why people are seeing all these flatlines before or non-increase in the small bowel section with the lactulose breath test.

More than likely, the fructose, it's going to be your universal food source for these gram-negative bugs which we now know are often the most common bugs found there.

Dr. Allison Siebecker: Well, yeah, that's just astonishing. Dr. Pimentel is doing this research—well, it's fairly new—that shows that hydrogen SIBO is E. coli and Klebsiella. And yet those don't ferment lactulose. It's really astonishing.

[25:30] The Ideal Substrate: Fructose

Dr. Allison Siebecker: Hearing all of these, hearing that, and your description about the three substrates really would make fructose the ideal substrate because it eats everything, ferments everything. And it's not quickly absorbed.

I mean, it is absorbed. Lactulose is absolutely not absorbed being synthetic. Fructose is, but very slowly.

Dr. Jason Hawrelak: That's right! And I would love for someone to do some research on it. It would be great if we can just do one test, and we have some greater data around it that doesn't involve having to do two or three. And as I've said, I've dropped from three down to two because I'm pretty confident that we'll pick it up with the two. But based on the data that I've got, if I had to choose one test for somebody who's financially limited, I would just choose fructose.

Dr. Allison Siebecker: Okay, on that note, for the financially limited...

And by the way, if you want, you can stop screensharing, and then people will see you, your face, better.

Dr. Jason Hawrelak: Ah okay! Let's see if I can do that.

Shivan Sarna: Well, also, people in America wouldn't need a prescription.

Dr. Jason Hawrelak: That's true!

Dr. Allison Siebecker: Oh, really good point. Super good point. Lactulose is not prescription where you are?

Dr. Jason Hawrelak: No, I've been using it therapeutically as a prebiotic for my patients for like 21 years. And every chemist has got it. It's easy to come by. It's inexpensive. And yes, from a testing perspective, it's easy access for patients because they can order it themselves. They don't need a doctor to be involved with getting it.

Dr. Allison Siebecker: That's just amazing!

[26:58] Cost: Double/Triple Testing

Dr. Allison Siebecker: Okay! So on that note of finances and logistics, you've been doing double testing (and then, for quite some time, triple testing. But now you're back down to double because you've switched). Can you tell us a little bit about that financially and how it works for patients? Are most people able to do that?

Dr. Jason Hawrelak: Yeah, most are. That's not everybody, but most of my patients are. And the people I work with are the ones that are like yours, Allison. They've been unwell for a long time. And they've been waiting to get clarity from a diagnostic perspective for potentially many years. So at this point, they're actually, "I want answers." So they're okay with actually paying for testing to get those answers.

And I'll talk to patients about the pros and cons of testing versus not testing. If finances are limited, if they're able to just do one, then it's fructose. Or we could diagnose based on presumed SIBO. And again, out of 130 people I thought would quite likely have SIBO, 115 did. So it's not that off.

But again, there's methane versus hydrogen. Yeah, we know there are patterns that usually fit. Most people with methane are constipated and most people with hydrogen have diarrhea. But it's not always that way. You get the occasional person that's got diarrhea and high methane. And you would treat inappropriately if you have not done the testing around it.

So, I always urge to get the testing done to get a definitive answer around that. And my patients generally have been quite able to do it.

Dr. Allison Siebecker: Okay! And as you've said, for people who really financially can't, your data that was on the screen for quite a long time there showed fructose would be your best bet as any single one.

Dr. Jason Hawrelak: It would. It picked it up in more cases that others usually miss. And you combine that with the data, it was the most accurate.

Dr. Allison Siebecker: Yeah, I looked at some of the other numbers. You had 60 patients who were positive with all three substrates. But it was 31 patients who were positive not with all three but with one or another. And I'm not statistician, so my math isn't perfect here. But just as a quick look, I've added 19, 8 and 4. That's what I did there...

Dr. Jason Hawrelak: Ah yeah, yeah... okay...

Dr. Allison Siebecker: And so that's half! Half the people that came positive on all three, half didn't. And your best bet is going to be fructose within there which is really fascinating.

Dr. Jason Hawrelak: It totally was for me.

Listen, my feeling from looking at these results over the years was like I think fructose is the most accurate one here. It's picking up more than glucose, picking up more than lactulose. But it was nice to actually correlate the data together.

I did it in bits. I did my first 30, and I was like, "Ah, look at that pattern." And then, we got the next hundred patients added. And it was the exact same percentage as it was with 30. And I was like, "Okay, this pattern is definitely there."

I'm very confident with fructose as part of that regime. And as I've said, the data seems to suggest that, if you just did one, that would be the one.

[30:04] SIBO & Fructose Intolerance

Shivan Sarna: I have a question. I have a couple of questions.

So, just on a personal note, I did test as fructose intolerance. And I'm fascinated by you saying the following words: "fructose intolerance caused by SIBO." I've never had that conversation before. And I want to have conversations about this topic. How does that work?

Dr. Jason Hawrelak: Essentially, it's just that fructose is being used as a food source by small bowel microbes that are overgrown. They could be eating sucrose, they could be eating glucose, a bunch of other things. But in this case, fructose.

Dr. Allison Siebecker: Lactose...

Dr. Jason Hawrelak: Yeah, lactose. And you see it with lactose too. And I've had other patients who I've done four. I've added lactose in there too if I suspect they're getting symptoms from milk and ice cream and things like that. And you see again that small intestinal spike in lactose, you treat them, and then they no longer have lactose intolerance (like they no longer have fructose intolerance). So it's just another marker of SIBO.

I don't know why we just have glucose as an accepted marker. These other food triggers can feed microbes in the small bowel quite as well and might have other attributes that makes them easier and more appropriate to assess the presence of SIBO.

[31:19] New Frontiers in Diagnostic Testing

Shivan Sarna: This is a little bit of a side thought. But when I hear the word "fructose" and I think of sugars like that, and your patient was on a low sugar diet because of Candida—people are always trying to figure out if they have Candida—could there

ever be a test do you think of a fructose breath test for Candida? Does that even work?

Dr. Jason Hawrelak: I don't think this gentleman had Candida. I think that he was just doing a trial-and-error, and it's worked out that this low sugar diet wasn't feeding the SIBO bugs as much. His symptoms were reduced when he eats that way. And essentially, the fructose in those fruits was feeding the SIBO microbes.

We know that SIFO exists. We know that we can have Candida overgrowing in the colon too. What I look forward to one day is when we can just swallow a little capsule that will be able to sample bits of our small bowels and make its way down and tells us exactly what's overgrown and exactly what species. And I don't think that's too far away. Then we can probably get away from using breath tests altogether.

But for the meantime, I think breath testing...

Shivan Sarna: A year... five years... what do you think, doctor?

Dr. Jason Hawrelak: Oh, I'd like to think in five years. But we'll see...

We're already swallowing those capsules and we're getting a good look around. All we have to do is get some sort of sampling technology, and then using the DNA testing approaches so we could actually categorize what bugs there are.

Shivan Sarna: Exciting! That's very exciting.

[32:41] How to Do a Double/Triple Breath Test

Dr. Allison Siebecker: Okay! Now, I have a couple of logistical questions. If you're doing two or three tests, how do you do the prep? And on what days do you do the

prep? And on what days do you do the test? Do you have an order in which you prefer to do the different substrates?

Dr. Jason Hawrelak: Yeah, that was a bit of trial-and-error. But it's a great question, yes. Glucose first, fructose next, and then lactulose last… that's what I worked out.

Lactulose was the most likely sugar to induce a few days' worth of symptoms after ingestion versus the acute flare symptoms that you get with the other ones. So it kind of slows the process down if you do lactulose first. You might have to wait a week for things to settle back down to the point where it seems okay to try adding another sugar in. I found that glucose is the least likely to induce symptoms; fructose is next. And then, lactulose… long-lasting symptoms rather than acute would upset things definitely.

So, I typically have them do a low FODMAP diet for a day beforehand, maybe two… depending on how willing they are. I think one day seems to be bearable, but two obviously would be better. And then, we'll do the glucose. And if they have no symptoms, we'll get to do fructose the next day. And if no symptoms, we'll do lactulose the next day—or just acute symptoms like "Oh, I've got some bloating and distension for an hour, and then it goes back down." That's fine.

My concern with lactulose is, because it gets fermented in the colon in everybody, it might upset the gas dynamics a bit even if they're not symptomatic. So I thought, "Okay, let's move that for the end." If all's going well, you shouldn't produce gas from the fructose or glucose if your gut is behaving properly […] It should just be absorbed, and there's no gas being made.

Dr. Allison Siebecker: Okay! So, that goes right along with the way I have been teaching to do glucose and lactulose. Day one is your prep diet. Day two, you do the glucose breath test in the morning. But then you follow the prep diet again for that

day. And then, in the morning of day three, in this case, we would be doing fructose, or you would be doing lactulose in our old way.

But now, the way it's going to be, because you do fructose and lactulose, is day 2 is fructose. And then, day 3 is lactulose. And then, after the lactulose, you don't need to do any more prep diet because you're done.

Dr. Jason Hawrelak: That's right, yeah. And I think that's the advantage of dropping it down from three to two, one of the advantages.

I think for my patients, they pay out of hand for the breath test. So it's $120 per sugar, $240. So there's a bit of cost there. But there's actually the days involved with the prep diet...

It's just one day of sitting around at home for 20 minutes breathing into bags. Still, if we can avoid that, and still get good results, I'm happy with that. I just wasn't having a single sugar that I couldn't necessarily trust.

And I still think, and I still push very much, for lactulose and fructose. I think that still gives us the broadest. It picks up the most SIBO cases for the least cost and the least effort.

Dr. Allison Siebecker: Okay, I have one more logistical question. Shivan, did you have a question?

Shivan Sarna: I think you asked it.

Dr. Allison Siebecker: Okay! Okay... so also, you and I know talked about this, Jason, but in most breath testing labs, they do lactose and fructose as a 4-tube sampled every hour, baseline and then every hour. And obviously, you're doing it like a standard SIBO test, either testing every 15, 20 or 30 minutes. So, can you explain how you handle this? You don't have your own machine, right?

Dr. Jason Hawrelak: No, I don't. I'm using a lab. I'm lucky that here in Australia, we've actually got a number of labs—a couple, two at least—that will do fructose 20 minutes by default. I always had 20 minutes by default with fructose. When I first started ordering, it was always 20 minutes… which was great. I think if I would've been stuck with the 60-minute one, I wouldn't have seen a pattern. You would've seen really normal 60-minute…

Shivan Sarna: What is the 20-minute by default? Can you explain it?

Dr. Jason Hawrelak: Essentially, you're breathing into one of those tubes every 20 minutes just like you do with lactulose. I agree that some of those labs that are doing fructose do it by 60 minutes. Every 60 minutes, you breathe into a tube. And it's like, "Ugh, you miss so much information!"

Dr. Allison Siebecker: So much, it's insane.

Dr. Jason Hawrelak: I will not ever recommend that. I think you've really got to do it—

Thirty minutes is bearable. But actually, my patients that are US-based, I generally suggest that, instead of doing it every 30 minutes, they do it every 20 minutes. Yes, they may go over for two hours instead of three which is less than ideal, but I'd actually rather get that clear data to see…

The more breath points we get before 90 minutes, the more accurate the information we have to work with. And I think that 30-60-90, eh, it's okay. But 20, 40, 60, 80 is much, much better.

Dr. Allison Siebecker: In my experience with labs I've worked with, generally, you could just call and ask and they'll just adjust their pricing. Same thing! You're just saying, "Please send me this many tubes. I want to test every 20 minutes."

And the other thing is you and I are both a fan of testing throughout the third hour to get all the information you need. So you're doing that as well. You're making sure you get enough tube samples that brings you all the way through three full hours.

Dr. Jason Hawrelak: And I think it's the methane stuff. Sometimes, we don't see that chronic methane rise at all between the 2- and 3-hour mark. And if we just have 2 hours, we're going to miss that… and again, that means misdiagnosed patients and mistreated patients potentially. So yeah, I fully concur.

I did note that your prices are a little bit cheaper than in the US. So I think some people will groan about the price of trying to do two. But at least we have this information that people should probably be trying fructose as their first choice. Really fascinating!

Dr. Allison Siebecker: I had I think one more just general point I wanted to make which was… in listening to your case example, it was such a great example of the thing that I'm really seeking out and that you are because we see people who failed other treatments which is that "I don't want to miss a SIBO patient." That's what is really standing out to me here. We don't want to be doing our SIBO tests, missing them, and then how many more years are they going to be spinning their wheels.

Dr. Jason Hawrelak: I totally hear you. And that to me is what the data showed. When I started seeing all those flatline lactulose, I would've missed that if I just done that. If I just did glucose, again, I would've missed cases. […] How do we find out what's wrong with this person properly this time? I agree, we're working with people who have been misdiagnosed potentially for years. And we don't want to add to that.

Dr. Allison Siebecker: Those are all my questions.

Shivan Sarna: Thank you so much.

I know this will lead to even more questions. But that's a great foundation right there. I want to thank both of you for taking the time to share this information. Keep up the great work! I really appreciate your devotion to the cause.

Dr. Allison Siebecker: Thank you so much, Jason!

Dr. Jason Hawrelak: Ah, thank you. Thank you for having me on. It's been great chatting with you. I'm just excited being able to share this out there because it's good to have the clinicians doing it and seeing what they're observing and hopefully get some researchers onboard to go, "Hey, let's check this!" because it could revolutionize treatment results. And I think that's a huge thing that we're all wanting in terms of better diagnostic accuracy. It's a huge win for patients and practitioners.

Dr. Allison Siebecker: Thank you!