Examining the Root Cause of SIBO

Going Beyond the Bloat

with Kiran Krishnan

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Shivan Sarna: Hi, I'm Shivan Sarna. And I founded SIBO SOS®. The "SOS" has come to mean "save ourselves." And if you're new, what is SIBO? It's *small intestine bacterial overgrowth,* the number one underlying cause of IBS. You have to find out the underlying cause for your SIBO because it's caused by something and it causes other things.

Kiran Krishnan is my very special guest today. He is the co-founder of MicrobiomeLabs, the very famous Megaspore soil-based probiotic. It may be something you've thought about our explored or heard of before. Cool! Glad you're here.

And Kiran travels the world (like he was just talking about Iceland) teaching researchers, doctors, microbiologists, health coaches and everyone sort of in between about the microbiome.

Recently, there's been some very exciting new developments which is that they're coming out with even more strains. And also, in my personal opinion (even though I don't know, but it's what I'm hoping), they're reinventing and recreating how we all take care of our oral hygiene.

If you know me, you know I've created the SIBO SOS® Summits, the Digestion SOS™ Documentary, the Lymphatic Rescue Summit, the Microbiome Rescue Summit, the Dental Health Connection Summit. Coming up in the Spring of 2022, we have the Liver & Gallbladder Rescue Summit. I'm very excited about that. And then, next year, in September, I'm doing the Fascia Rescue Summit. The fascia is the container of material underneath our skin which has so many health implications.

I like to go places where not everyone is and fill in the knowledge gaps that we all have.

That's where Kiran really comes in. He has been super generous to our community, giving us discounts that aren't available elsewhere and helping you to go direct to MicrobiomeLabs to be able to pick up products.

Without further ado, it is my pleasure to share with you Kiran Krishnan and his take on the microbiome and SIBO, small intestine bacterial overgrowth. It is somewhat different if you are a regular than what a lot of people teach. And so I'm excited to hear about it because I embrace all methods… like let's get her done!

Okay, Kiran, take it away!

Kiran Krishnan: Thank you so much Shivan. I really appreciate this opportunity.

[02:50] Going Beyond the Bloat

Kiran Krishnan: What I'm going to take you guys on today is a little bit of a journey, an intellectual journey, let's call it, of how I explored and thought about SIBO. When you really break it down and you take a pragmatic approach to what this really is, you start to illuminate things that aren't talked about enough when it comes to dealing with this condition.

And now, I'll give you the ending right off the bat. This will be some cool movie where there's a circle composition where the movie starts at the end and then you figure out how you got to the end.

But basically, what I concluded, when you start looking at all the pathologies involved, SIBO is not a condition in and of itself. That's the thing that I think we need to get away from. When someone is experiencing SIBO, we become extremely focused on the overgrowth itself and the resulting bloat. That becomes the be-all/end-all of "are we helping this condition or not?" In fact, I think if you go through this journey with me, what you'll come to realize hopefully is that SIBO is a symptom of a bigger, longer-term problem.

Unfortunately, what allopathic and natural medicine has done is made the symptom the target. And that's where we see issues. That's where we see people not really

resolving this problem… when we constantly go after the overgrowth directly and we don't deal with or really understand the underlying drivers behind the overgrowth. We're not really dealing with the problem at the root cause.

And allopathic medicine has its way of going about it… which is how they go about lots of other medical conditions. In some cases, it's beneficial; in some cases, it's not. But the role of functional medicine and integrative medicine or natural medicine is that we're supposed to be going after the root cause. But we've become obsessed with the bloat and we measure the success of any sort of treatment for SIBO by looking at whether or not it alleviated the bloat in the short term. So that's the part that I think needs to be rethought.

Now, the bloat has to go away at some point, yes. That's not a question at all. But that is not the first thing. The bloat should eventually go away if you get to the other root causes.

So, I'm going to take you through this a little bit. And for that reason, I call this presentation, *Going Beyond the Bloat*.

If we're really looking at the root cause of SIBO, we have to go beyond the bloat. We have to look at the other physiological issues that are driving this overgrowth of bacteria in the small intestine that is leading to the bloat. The bloat, again, is a symptom of something bigger that's happening. And SIBO, in general, becomes a symptom of something bigger that's happening.

So, let me go through this for you guys. I'll shut off my camera temporarily so this thing is not in the way. I'll bring it back on when we get to the Q&A.

[06:04] Digestive Syndromes: IBS vs. SIBO

Kiran Krishnan: So first, looking at conditions like SIBO, we have a label for it. We call it *small intestine bacterial overgrowth.* There's a medical diagnosis associated with it

just like there's a medical diagnosis for IBS and there's a percentage of IBS that's actually SIBO or a percentage of SIBO that's actually IBS. And part of it to me is all of this is in a way kind of misdirecting people and creates mis-direction in terms of approach. These conditions are all so similar in many ways and differentiated in a few different ways. But in general, they are digestive issues that are driven by probably the same underlying factors.

So, let's just look at some of these statistics that you can find out there.

"Between 4% and 78% of irritable bowel syndrome is caused by SIBO."

When you a statistic like that—I pulled this off the CDC or something website—it's almost laughable. How can something be between 4% and 78%?! That's like between 0 and 100. If I said between 1% and 99% of conditions are driven by this, this condition being driven by this cause, it would be laughable because 1 and 99 is a very different number. Just the same here… between 4% and 78% of irritable bowel syndrome is caused by SIBO. It's almost meaningless. It just means people's bowels aren't functioning properly… the way they're supposed to.

And the most common symptoms of IBS, both C and D, are abdominal pain and/or discomfort, irregular stool form and passage, bloating, constipation or diarrhea, and then of course the most common symptom of SIBO are also abdominal pain/discomfort, bloating, flatulence, loose motion or constipation and so on. Very similar, overlapping symptoms, lots of similar dysfunctions, and yet we have these labels for each of these things—IBS-C, IBS-D and SIBO and methane-based SIBO and hydrogen-based SIBO.

We want to label things because we want to compartmentalize them and put them in a box. **We're so used to labeling conditions and then finding a singular treatment for that one label condition**.

What all of these are actually syndromes. And all of them are likely driven by the same root cause.

How they manifest, whether the syndrome manifest as IBS-C or manifests as methane-dominant SIBO, is based on where your microbiome was when it got dysfunctional.

Also, it depends on what influences you around you, what types of food you're exposed to, what your environment looks like and all that. That will dictate whether this becomes chronic diarrhea or chronic constipation or this becomes methane-dominant or hydrogen-dominant.

All of those end points aren't as significant as what is driving at the root cause.

And the scary thing about this to me when I started digging into this and going down this journey is that, when you look at the root cause dysfunctions, yes, they create these digestive issues that really wreak havoc on your quality of life because you can't eat things, you get this bloating response and discomfort and all of that. But the bigger, underlying problems are much more serious. And they have much more long-term consequences if we don't address the parts of the physiology that are falling apart and are leading to these symptoms.

I hope that made sense. This will get clearer as I go through.

[09:50] Traditional Definitions for SIBO

Kiran Krishnan: **SIBO, officially, is defined as an increase in bacteria equal to or greater than 10^5 colony-forming units per mL of upper gut aspirate**. So the only definitive way to know that you have SIBO is to do an invasive upper gut sample. You put in a tube down your throat and you get samples of aspirate from your upper GI. They plate it, and then they look and see is it higher than 10^5 colony-forming units.

And 10^5, keep in mind, is not a big number. It's basically 1 with five zeroes in front of it. So it's about 100,000 bacteria per mL of upper gut aspirate. And that's not a lot when

it comes to bacteria. It's 1 with five zeroes. So it's about 100,000. And when you go over 10^5, now you officially have small intestinal bacterial overgrowth.

Keep in mind that the large bowel has 10^{12} CFU's of bacteria. That is 1 with 13 zeroes after. That's a big number. And that's normal. That's a normal bacterial concentration of the large bowel versus the small bowel where, if you are 10^5 or more, you are now in this diseased state.

So, there's a significant difference in what the large bowel and the small bowel are supposed to house and handle when it comes to bacteria.

And yeah, the large bowel and small bowel, in many ways, are quite similar in terms of the environment. The small bowel does have more oxygen, so it does favor facultative or organisms that can deal with oxygen and lack of oxygen. And the large bowel is mostly anaerobic, meaning there's no oxygen there. So that's a big difference.

But for the most part, both areas are really good areas for bacteria to grow. The small bowel is warm, it's moist, there's lots of food coming through, lots of liquid coming through. There's endless substrates. There's all these mucus layer to bind to. They can even eat away at the mucus layer. And yet, somehow, bacteria are prevented from exceeding a 10^5 CFU per mL of aspirate level, whereas in the large bowel, bacteria go to crazy numbers like 10^{12}. And remember, 10^{12} is again 1 with 13 zeroes in front of it. That's a massive, massive number compared to the small bowel with 1 with five zeroes in front of it.

It's widely accepted that stasis, so the bowel is not moving, is a feature of SIBO. And that's an important thing to keep in mind. That's a fundamental function of your digestive tract, is to move. And there's a couple of mechanisms that drive that. And if your bowel stop moving, and defecation becomes infrequent, that is a fundamental issue. That has an effect on the rest of your body in many ways.

And this is a fundamental feature of SIBO. And so, to me, that's one of the things that one should hone in on as to why that is happening. It's not about just "let's try to keep stimulating the bowels. Let's use prokinetics and try to trigger the bowels into moving." The question is: "Why have they stopped moving?"

And that, in talking to a lot of the clinicians that I get to work with all the time who were working on SIBO and treating patients with SIBO, that question is not asked very often. And because it's not asked, there's no approach for it. So the big question to me is: "Why has that stopped moving?"

So, when you think about this as a condition—and this is how I thought about it, this is where the journey starts a little bit when you go on it with me—I have a few fundamental questions.

Keep in mind, I haven't been working or thinking about SIBO for a very long time because I focused my work early on on leaky gut. To me, that was a key, fundamental issue that needed to be addressed. And so we started doing publications on leaky gut. We developed products. We were able to support and resolve this whole issue of intestinal permeability. And so that has been my focus.

But about 3 or 3 ½ years ago, I had so many questions from practitioners and patients all the time about SIBO and why the current approaches aren't working both in natural and allopathic medicine—the condition is just not getting better, or it may get better temporarily, but it comes right back. And it's of course fundamentally a gut question. So that's when I started digging into it. Let me think about this problem a little bit. Let's go through a mental exercise, if you will, to really break down this issue and ask the right questions about it. And that's a critical part before you can ever come or arrive to any sort of solutions.

[14:55] Fundamental Questions in Understanding SIBO

Kiran Krishnan: So, the first question to ask is: "What is overgrowing?"

And keep in mind that I've asked many clinicians that work with SIBO these questions. And not many of them can answer most of these questions because the focus, again, is: "My patient gets really bloated when they eat food. So let's stop eating those foods, step one. Number two, there's bacteria overgrowing in there, so let's kill, kill, kill all those bacteria." That tends to be the kneejerk response. But really understanding the root causes of this has not been the focus.

So, the questions I ask myself are:

"What is overgrowing?"

Very clearly, something is overgrowing.

And then, if there's something that's overgrowing: **"Are they dysbiotic bacteria?"** meaning they shouldn't be in the small bowel **"Or are they the native microbes in the small bowel?"**

There are naturally microbes in the small bowel. Remember, they have to be below that 10^5 CFU's per mL level. But nonetheless, there are bacteria there. Is it the natural bacteria of the small intestine that started to overgrow? Or are these dysbiotic organisms that are coming from elsewhere?

And if they are coming from elsewhere and they're not the native bacteria: **"Where are they coming from?"** What is feeding the system with these dysbiotic bacteria?

And then, if they're there, whether it's natural microbes or dysbiotic microbes: **"Why are they overgrowing?"** What is driving their growth in people with SIBO compared to people who don't have SIBO? How is it that microbes in the same kind of

environment, in my small gut versus your small gut, why is it that, in one person, it can grow well beyond the 10^5 limit, and then in other people, there's this limit that's set physiologically that it doesn't exceed. So that is a big fundamental question.

And then, if stasis is an important part of SIBO, that's an underlying factor: **"What's driving that stasis?"** Why have the bowels stopped moving? That's a very important question to ask.

And in order to understand why microbes are overgrowing in the small bowel of people with SIBO, you really have to understand what are the natural protections against these issues? What protects against the stasis? What protects against the overgrowth? What protects against the inoculation by dysbiotic bacteria if that is what is found in SIBO? Those are the important questions to ask.

Keep in mind, even though SIBO is really prevalent, there are hundreds of millions of people out there that don't have SIBO. So what is it about their physiology that prevents bacteria from overgrowing or even arriving there if they're coming from a dysbiotic source.

So these are the important things.

[17:42] The Multifactorial Aspect to SIBO

Kiran Krishnan: And when you really look at SIBO, when you look at the diversity of people it affects, the age diversity, it can affect a 12-year old just as much as it affects an 80-year old, it can affect a man just as much as it affects a woman at almost any stage of their lives… there is no real clear pattern into who's the most high risk individual or type of individual for this condition.

And it's also quite complex in terms of the onset of the condition for different people. It's not always somebody that had known food poisoning. It's not always the same driver in every case or diagnosis of SIBO.

And so to me, it must be multifactorial, a number of things that have to go wrong for someone to arrive at having this particular condition.

And in addition, it must be driven by common behaviors. Because it's so prevalent, and because it affects in a broad spectrum, it can't be something exotic that's causing this condition. It can't be some unique, exotic pathogen or only those that have traveled to the Amazon have this condition, or only those of a certain demographic have this condition. Because it is such a prevalent condition with such a wide variety of sufferers, it has to be driven by very common behaviors, things that impact lots and lots of people.

So that is the series of fundamental questions that I asked myself. And we started digging into the literature to try to understand those questions and the answers associated with them.

The good news is there's a lot of information out there and a lot of data that points us towards the right answers.

[19:31] What is Overgrowing: Dysbiotic or Native Organisms?

Kiran Krishnan: So, the first question: "What is overgrowing?" and "Are they dysbiotic or native microbes?" Well, the interesting thing about SIBO is there's been a lot of study about SIBO in certain specific conditions. In the case of non-alcoholic fatty liver disease, NASH which is non-alcoholic steatohepatitis or hepatosteatosis, in these conditions, SIBO or the overgrowth of small bacteria over 10^5 CFU's per mL of aspirate

is quite predominant. And because of that, in these conditions, they have done a lot of studies looking at microbe samples of the small bowel, plating them, characterizing them, trying to figure out what is actually growing in these individuals when they have SIBO.

As they turns out, it helps answer the question that **these are dysbiotic organisms**.

To begin with, the predominant microbes in a healthy small intestine—so these are the native microbes if you don't have SIBO—tend to be gram-positive bacteria like and Blautia and Rumminococcaceae. These are examples of the normal microbes that are in that region, that are in the small intestine.

Now, when you get SIBO, what you tend to find is that **overgrowth in SIBO is characterized by a taxa shift**—so taxa stands for "taxonomic," you know how all organisms and species can be put into this taxonomic characterization. **And it's a taxa shift to gram-negative bacteria**.

So, from gram-positive bacteria which predominates a healthy small intestine, now in SIBO, you tend to find a shift towards a predominance of gram-negative bacteria such as Enterobacteriaceae, E. coli, Klebsiella pneumoniae, Proteus mirabilis as well as other gram-negative organisms like Pseudomonas aeruginosa.

Now, many of these—you guys are familiar with microbes—are also potential pathogens. They're not necessarily direct pathogens in the sense that the moment you have them colonizing, they're going to cause illness, most of them are opportunistic organisms and potentially pathogenic. And the key is they are gram-negative bacteria.

Now, for those of you that don't know what gram-negative versus what gram-positive is, a quick explanation is that every bacteria in the world can be designated as gram-negative or gram-positive. When you take a bacterial cell and you put a stain on it called a gram stain, some bacteria absorb that stain in their cell

structure because they have a cell wall around them. They have a cell membrane and then a cell wall on the inside of that membrane as well.

That cell wall structure will absorb the dye. And when you look at them under a microscope, they look more blue or purple. That means they're gram-positive.

Gram-negative bacteria don't have that cell wall. They only have a cell membrane.

And another characteristic about a gram-negative bacteria is they have an endotoxin embedded in their cell membrane called LPS, lipopolysaccharide. That's an important thing to keep in mind as we move forward in this conversation.

So the taxa shift when you start seeing an overgrowth in the small bowel that's leading to a diagnosis of SIBO, you're going from gram-positive (benign bacteria like Blautia and Rumminococcaceae) to opportunistic, pathogenic-type of organisms that are gram-negative now growing in the bowel like E. coli, Klebsiella, Enterobacter and so on.

There are some gram-positive bacteria still found, but they are more on that opportunistic spectrum like Staphylococcus, Streptococcus, Enterococcus faecalis, Enterococcus faecium. These are gram-positive potential pathogenic organisms or opportunistic organisms that are also found in the small bowel of people with SIBO.

And these again are not the native microbes that should be there.

So, as you can see, they're clearly dysbiotic bacteria. And then, it also allows us to understand what is actually overgrowing.

So, in SIBO, we know that it's opportunistic gram-negative and some opportunistic gram-positive bacteria that are growing... and they are dysbiotic bacteria meaning they don't belong in the small intestine naturally.

[23:59] Where are the Dysbiotic Bacteria Coming From?

Kiran Krishnan: And if they don't belong to the small intestine naturally, and they are dysbiotic, then the big question is: "Where are they coming from?" What is the source of these organisms?

Although a number of these SIBO bacteria are naturally found in the colon, to me, this is a secondary route.

When I first started talking to functional medicine doctors about SIBO seven or eight years ago when I first just started, in a cursory way, looking at this thing, I always heard that these microbes in the small intestine were coming up from the large bowel past a dysfunctional ileocecal valve and entering into the small bowel that way. To me, that didn't quite make sense because that's a very unusual dysfunction to occur—where your ileocecal valve is dysfunctional and then you have this particular mix of bacteria in the proximal end of your large intestine now moving up with some force because it has to move up to a good portion of your small intestine. Your small intestine is 20-something feet, so it has to be moving up with some force up into your small intestine and inoculating the system. To me, that seemed like a less plausible way for these microbes to get to where they are and remain as dybiostic microbes.

There's another source for me which could be likely the primary source of these dysbiostic microbes… and that is the mouth!

The mouth houses all of these dysbiotic bacteria—E. coli, Enterobacter, Proteus, Staphylococcus, Streptococcus, Enterococcus. People's mouths, especially dysfunctional, unhealthy mouths—which **at least 94% of Americans have unhealthy mouths**—house these types of microbes at really high levels.

You are swallowing these microbes every single day. You're swallowing it every minute as you ingest your own saliva. Saliva is washing over the teeth, the gums, the

soft tissue in the mouth. And then, it's taking these bacteria and you're swallowing them as if you're taking an opportunistic supplement every single day. You're getting large amounts of these bacteria moving into your digestive tract from your mouth every single day.

And there's some connections on this. It's interesting to look at these connections. **When you look at 60% of diabetic patients, they yielded oral Enterococcus fecalis and E. faecium**. Sixty percent of them have oral Enterococcus fecalis and E. faecium compared to only 6.6% in controls.

That means, if you're diabetic, you're 10 times more likely to have Enterococcus faecalis and E. faecium in your mouth.

At the same time, diabetics also have a much higher prevalence rate of having SIBO.

A recent study has found that SIBO is present in 43% of diabetic patients with chronic diarrhea. And 75% of them had improvements in their symptoms after being treated by antibiotics.

What does that say? That says that diabetic individuals have exposure to opportunistic or pathogenic organisms that are causing SIBO-like symptoms. And when you use an antibiotic and kill bacteria, that seems to alleviate the symptoms.

So that means there's a source of microbes entering into their system. And if that source is slowed down by an antibiotic, the symptoms abate. And so that is a really interesting connection.

And keep in mind, two of the species that are SIBO dysbiotic bacteria are Enterococcus faecalis and Enterococcus faecium.

This shows diabetics who have a higher tendency to have SIBO, who also have a high tendency to have Enterococcus faecalis and faecium, they tend to have SIBO-like

symptoms when those microbes are found readily in their mouth as well as in their small intestine as overgrown microbes.

So, this is just a rough connection just to show you that there's some line of thinking here that there's a connection between the oral microbiome and a chronic condition like diabetes and how that chronic condition like diabetes is also related to something like SIBO and how the same dysbiotic bacteria in the mouth of people with diabetes is also present in the small bowel of people with SIBO. Diabetics and SIBO tend to share a lot of commonalities as well.

So again, this is just to demonstrate that there are connections. This is not definitive. It's not diagnostic in that way. But it just shows you that there's an influence on what is growing in your mouth to what happens to your system chronically. And that can impact things like metabolic health in diabetes, or it can impact digestive health as in the case of SIBO.

[29:00] Why are the Organisms Growing?

Kiran Krishnan: Now, because we know that they're dysbiotic bacteria in the small bowel and that they are overgrowing past that 10^5 limit, then the big question is: "Why are they overgrowing?" Why don't these types of microbes grow in other people that don't have SIBO?

That leads us to understanding the natural protective mechanisms against small intestinal bacterial overgrowth.

Remember, I mentioned earlier that the small intestine is a great place for bacteria to grow. There's lots of moisture. There's food coming in constantly. It's warm. It has all of these binding sites in the mucosa. So bacteria really should be growing there quite readily all the time at very high levels similar to the large intestine where you

find 10^{12} CFU's of bacteria. So what is it about the small intestine that naturally maintains low levels of bacteria?

The first thing is **stomach acid** acting as a gastric barrier. That means the number of bacteria that are entering into your small intestine through the oral cavity in a viable state should be low because your stomach acid should kill most of the bacteria you're swallowing, whether it's coming from food, water, drink sources or your own saliva. So most of the microbes entering into the digestive tract into the stomach, and eventually, into the small intestine, should be inactivated by stomach acid so they don't pose a threat as serving as an inoculation source for the small intestine. So stomach acid is one of the key protectors.

The second one is **bile secretion** and the **bile acid pool**. As you guys know, bile is formed by the liver, stored in the gallbladder, and then secreted into the small intestine when food is present. And bile plays a number of roles.

One of the key roles that bile plays is it acts as an antimicrobial. And I'll talk a little bit more about bile in a second. But keep in mind that bile is a super important component of maintaining a low level of microbes in the small intestine. Bile is not present in the large intestine. And that's one of the big differentiating factors as to why the large intestine can have such a high amount of bacteria, whereas the small intestine has this ceiling of a certain number of bacteria and it doesn't allow it to exceed that.

The other one is the activation of the FXR nuclear receptor by bile. I'll talk about that again a little bit more as we go along. But again, bile plays this dual important role in maintaining low levels of bacteria.

Then of course the fourth one is **peristalsis**. That's the movement of the bowels. The bowels are constantly moving, especially in the small intestine. It's moving things like food along so that food cannot sit in any given spot in the small intestine for a very long time.

Now, when you look at bacterial growth, when you take bacteria and you try to grow them in a plate, you give them all the food they want on that plate, **bacteria go through two phases of growth: a lag phase of growth and the log phase of growth**.

The lag phase is where the bacteria is just starting to metabolize the food and start turning on the correct genes to start multiplying. And it takes the bacteria some period of time before it starts to do the logarithmic growth. Normally, it takes 12-24 hours for most bacteria to get out of that slow lag phase and start going into the sharp log phase growth. It's no different than leaving some food out in the counter. It doesn't spoil immediately. It doesn't spoil in three hours. It doesn't spoil in 10 hours. More often than not, you'll have to leave it overnight—12 hours, 16 hours, 24 hours—before it actually goes to spoil. And the reason for that is all of these microbes have these lag phase and log phase growth.

Now, when you think about the digestive tract, when food enters the small intestine, that then becomes a source of fuel for the microbes that are in the small intestine to start metabolizing the food and start growing. But all of the microbes in the small intestine have that lag phase in their growth cycle, which means that in order for food to provide them enough energy so that they can then enter the log phase of growth, the food has to sit in the small intestine for more than 12 hours... but it doesn't because the peristaltic activity is so important in moving food along in a given pace so that your bowels can be emptied typically within a 12- to 14-hour period.

So, this natural movement of food through peristalsis does not allow food to sit in the small intestine long enough for bacteria to utilize it to start going into this log phase growth and then reaching super high numbers.

Now, it's different once it hits the large intestine. It can sit in the large intestine longer. And keep in mind, the large intestine is not as long. It doesn't have as much length as the small intestine. So any given area where the food remains in the large intestine, it remains for longer than it normally does in the small intestine. That gives the microbes in the large intestine ample time to consume that food, metabolize it, and

go into their log phase growth. That's part of the reason why the microbial concentration of the large intestine is so high.

And then of course the **migrating motor complex** is this wonderful electrical sweeping that occurs that cleans out the bowels. It cleans out the stomach, the small intestine, and it even helps shake the large intestine. And again, it's another clearing and movement of things out of the small intestine to keep it from becoming a place where putrefaction or fermentation can occur.

So, these are the mechanisms that are in place in individuals that do not have SIBO. When you compare two people, let's say they're basically almost the same health, same age, same weight and everything, and one has SIBO and one doesn't, the person does not have SIBO, the reason they don't have overgrowth of bacteria in their small intestines is because they have these five mechanisms working. These five mechanisms prevent the overgrowing of the bacteria in the small bowel.

The person with SIBO has at least one, if not multiple, not functioning properly. That's the crux of it all.

If you have SIBO, it's because your natural protection against bacteria being allowed to overgrow and dysbiotic bacteria to inoculate that space, those mechanisms aren't functioning.

[35:53] Natural Protective Mechanisms: Stomach Acid

Kiran Krishnan: Now, let's look at the natural protective mechanisms against SIBO. And we'll take each one of them one by one. The first one is **stomach acid** acting as a gastric barrier.

There are so many things in our society today that compromise our stomach acid production. Stress is one of the biggest one. Zinc deficiency is another one. H. pylori

infection, we know that at least 50% of the population is infected with H. pylori. And then, of course the use of PPI's (proton pump inhibitors) and antacids.

So, we have ample reason for stomach acid production to become compromised.

And remember, if stomach acid production is compromised, then the gastric barrier is not functioning, that means you're swallowing opportunistic gram-negative pathogens every minute of every day. And more and more of those opportunistic, gram-negative pathogens from your mouth are entering into your small bowel in a viable state… meaning they're not killed off and protected from in your stomach. They're entering into the small bowel in a viable state where they're going to start to fight for colonization.

So, H. pylori, stress, zinc deficiency… these are the things that are driving it. And PPI and antacid-use is probably one of the most prevalent.

If you just look at those two, just look at H. pylori, antacid, and let's throw in stress—what percentage of the population has chronic stress? In the adult population, it's almost 30% that's chronically stressed. H. pylori infection, at least 50% of the adult population as H. pylori infection.

But when you look at PPI's and antacid use, PPI's are one of the top three classes of drugs prescribed until they became over-the-counter. Now they're one of the top over-the-counter drugs being used by the population today.

Those three things are supremely common and are found as very, very common behaviors.

Remember, one of my rules as I was going through this… the things that are driving SIBO are going to be very common behavior because there are so many people that are dealing with this. The prevalence is so high. Stress, H. pylori overgrowth and PPI use are extremely, extremely common.

And when you look at the studies—so this a diagram of stomach acid production. It's not important. You guys either know this or you don't… and it doesn't matter whether you know it or don't.

But what's really important is there's a significant number of studies showing that proton pump inhibitor use—remember, proton pump inhibitors are medications used to help with acid reflux. The hypothesis is acid reflux is due to an over-production of stomach acid which we all know now, and the research is clear, that that's not the case. It's not an over-production of stomach acid. There are other factors driving the pressure in the stomach that is causing the regurgitation of that stomach acid. But anyway, PPI's are designed to slow down or stop stomach acid production.

And here's a meta-analysis paper (which is a systemic review of a whole bunch of studies). They concluded that several meta-analysis and systemic reviews have reported that patients treated with PPI's as well as patients who are post-gastrectomy—that means they removed the stomach—have a higher frequency of small intestine bacterial overgrowth compared to patients who lacked the aforementioned conditions. And this time, PPI-induced dysbiosis is considered a type of SIBO.

So, if the mouth is the primary source of dysfunctional bacteria in SIBO, it makes absolute sense that, if you compromise the gastric barrier, the thing that's supposed to protect us from viable opportunistic organisms coming from the mouth to the small intestine, if that barrier is compromised, then that should lead to a high incidence rate of SIBO. And sure enough, it does. The study show that it does.

So, one underlying factor in the presence of SIBO is where is your stomach acid production? What has compromised it? Are you dealing with stress? Is stress management a part of your SIBO protocol? Likely not.

Think about it… is H. pylori treatment addressing part of your SIBO protocol? Likely not. Is zinc deficiency part of it? Are you being compensated for the long-term use of PPI's

and antacids? These are critical things if you want to deal with the root cause of SIBO. So that's just one example.

Here's another increased incidence of small intestinal bacterial overgrowth during proton pump inhibitor use. **And they show that SIBO was detected in 50% of patients using PPI's, 24.5% of those patients with IBS and 6% of healthy controls.** So you're five times more likely to have SIBO if you're using proton pump inhibitors compared to controls**.**

There was a statistically difference between patients using PPI's and those with IBS or healthy control subjects. The data is absolutely clear.

[41:27] Natural Protective Mechanisms: Bile & the Bile Acid Pool

Kiran Krishnan: The next natural protective mechanism without the stomach acid and the gastric barrier, this one is the bile secretions. And then the second part of the bile secretion is the FXR nuclear receptor.

Remember, bile is made in the liver, stored in the gallbladder. And then, when you start eating food, your body secretes bile from the gallbladder into the duodenum, into the small intestine. And bile plays a role in a number of ways.

Number one, it helps you absorb fat-soluble nutrients. It also binds up fat and lipid-soluble toxins and takes it back to the liver for detoxing and removal from the body.

And then, it also maintains low levels of bacterial growth because most of the native bacteria that live in the small intestine are sensitive to bile. **Bile is a pretty strong**

antimicrobial. And if you combine bile with some long chain fatty acids in the diet, it actually has a surfactant soap-like quality to maintain low levels of bacterial growth.

Remember, the highest risk for bacterial growth comes from when you're eating food because you're providing a substrate to the bacteria. Assuming your bowel is not moving that well—it should be moving like we talked about earlier, the peristalsis—the food provides the substrate for the bacteria to sit and start metabolizing and start to overgrow.

Bile is secreted up to 15 times recycle during a single meal. As it moves through the small intestine, it coats the small intestine which means that it's coating all the bacteria in the small intestine which means it's providing a natural antimicrobial or **bacteriostatic** effect to the bacteria in the small intestine.

So, even though food is present, bile is not allowing those microbes to metabolize the food and start to overgrow. It's acting as a bacteriostatic.

Now, at the same time, bile keeps secreting through. It goes into the duodenum, moves all throughout the small intestine, and then it get re-absorbed in the ileum (which is the very end of the small intestine). And when it gets re-absorbed in the ileum and goes back to the liver, it takes fat-soluble vitamins and nutrients and deposits it in the liver. It takes the toxins that it picked out. And it starts having the liver detox it. Then bile gets cleaned up and refurbished and recycled back to the gallbladder for secretion again.

Remember, in one meal, you can have the same bile acid pool released and recycled through the small intestine 15 times.

And then, on its way to the terminal end of the small intestine, bile also activates something called the FXR nuclear receptor. By activating the FXR nuclear receptor, it turns on the intestinal epithelial cells in the small intestine to secrete antimicrobial compounds.

Think about that… not only is it acting as a bacteriostatic, preventing bacteria from growing in the presence of food, it's also causing the intestinal lining to release antimicrobial compounds to start bringing down and managing bacterial levels during a meal.

So bile play a two phased role here. And clearly, it's a natural protective mechanism against allowing bacteria to overgrow in the small bowel.

So, it would be logical that, if bile is somehow compromised, meaning your liver is compromised and you're not producing as much bile as you should be, your bile acid pool is diminishing with each cycle, and your bile acid pool is not being cleaned up properly because you don't have a healthy liver, it would stand to reason then that **liver dysfunctions will be associated with SIBO** because bile, the natural protective mechanism, is not functioning.

So this goes through bile itself. But when you look at the studies, it becomes pretty clear that liver disease symptoms in non-alcoholic fatty liver disease and small intestinal bacterial overgrowth are absolutely related.

What they showed here is "some studies reinforced the concept that small intestinal bacterial overgrowth plays an important role in the pathogenesis of non-alcoholic liver disease through endotoxins" which come from bacteria "and the activation of tumor necrosis factor as mediators."

So, what this is showing is that there's a correlation and a relationship between having small intestinal bacterial overgrowth and the progression and the development of non-alcoholic fatty liver disease.

So, with liver dysfunction goes small intestinal bacterial overgrowth. And this is mediated through an inflammatory pathology and the presence of endotoxins (which I'll talk about in a second). So this connection is there.

And then, there are more studies looking at the prevalence of small intestine bacterial overgrowth in association with non-alcoholic fatty liver disease which, of course, if you have non-alcoholic fatty liver disease, it means your bile acid pool and the ability of your liver to produce bile and circulate bile and use the bile circulatory pathway effectively is compromised.

So, in this study, they looked at 372 eligible people, meaning people that could have SIBO because they presented that way… 141 which is almost 38% of them tested positive for SIBO. That's called a study group. So these people that tested positive for SIBO are the study group. And 231, 62%, were negative for it. So that's the control group. So we had people with similar symptoms. Some, control group, no SIBO; study group, yes SIBO.

Non-alcoholic fatty liver disease occurred in 45.4% of the study group. So those diagnosed with SIBO, 45% of them also demonstrated non-alcoholic fatty liver disease compared to 17% in the control group. So it's quite significant. You're almost 2.5 times more likely to have non-alcoholic fatty liver disease if you're diagnosed with SIBO.

Patients in the study group were found to have higher rates of elevated aspartame aminotransferase and alanine aminotransferase. These are liver enzymes that are detected at elevated levels when your liver is dysfunctional.

And they also had higher levels of type II diabetes—we made the diabetes connection earlier as well—as well as hypertension and metabolic syndrome.

So, all of these larger scale chronic illnesses all go along with the same pathology.

So, it's not just about the bloat. The bloat is in part caused by the liver not functioning the way it should. **And when the liver doesn't function the way it should, there are much bigger problems to be had than bloating**. We're now going into the space of other kinds of chronic illnesses like diabetes, like hypertension, like cardiovascular disease and immune dysfunctions that are associated with it.

Immune compromization is a big issue with these kinds of pathologies. Just think about in this pandemic. Who had 10 times higher mortality rate than healthy individuals? People with diabetes. People with diabetes had 10 times mortality rate with the current pandemic than people who did not have diabetes who were of the same age.

Same thing with hypertension... they had six to seven times higher mortality rate than people who did not have hypertension who were of the same age.

So these conditions are all significant drivers of overall chronic dysfunction that goes well beyond the bloat that one may be experiencing at the moment because the liver is involved in all of these dysfunction... including SIBO.

So, this is part of the driver for why we want to think about this in a different way.

[49:33] Natural Protective Mechanisms: Peristalsis & the Migrating Motor Complex

Kiran Krishnan: The other protective mechanism is **peristalsis** and the **migrating motor complex**. We talked about how important it is for peristalsis to function because it has to keep the food moving through the system. If the food stays too long in the small bowel, it gives an opportunity for putrefaction. And it gives an opportunity for microbes in the small intestine to start utilizing the food in a maximum way and reach their logarithmic growth, thereby reaching very high concentrations in the small bowel and also creating toxic compounds and byproducts from that, compounds like p-cresol, ammonia, hydrogen sulfide, all of these things.

These are all things that are toxic to the system. They drive major inflammation. They drive significant leaky gut. This all tends to happen in people who are getting a

fermentation effect in the small bowel. And part of that is because the food is not moving through fast enough because of the stasis and the lack of peristalsis.

And the migrating motor complex also gets compromised in the same fashion. And if it is compromised, then we're not cleaning and sweeping the bowels. All of these types of conditions like Celiac, gastroparesis, enteropathy, diabetes, hypochlorhydria (which is the lack of HCl), all of these things drive this condition of stasis.

And of course, LPS, the lipopolysaccharide that I mentioned earlier that was in connection between SIBO and liver disease, that LPS was one of the lynch pins driving the connection between SIBO and liver disease. LPS from where? From gram-negative bacteria. It's also a critical part of what drives the peristalsis and migrating motor complex dysfunction.

Remember, our second slide showed that the types of bacteria that are overgrowing in SIBO are gram-negative bacteria, whereas the healthy bacteria in the small intestine should be gram-positive bacteria. One of the features of having gram-negative bacteria means you have a lot of LPS, lipopolysaccharide because gram-negative bacteria have this LPS in their cell membrance, whereas gram-positive bacteria don't. So if you have SIBO, you have SIBO dysbiosis in your small intestine, now you're producing lots of LPS, lipopolysaccharide.

And LPS is a key thing that stops the bowel from moving if you look at these studies.

Here's one interesting study published in 2014. And this was looking at pediatrics small intestine bacterial overgrowth in low income countries. We've all seen pictures from third world countries that are inundated with poverty and famine and all that. You see the kids with the really bloated bellies. So SIBO is a feature here.

They were studying this as how does this occur in these low income countries. And their hypothesis was "that the mechanism of SIBO development in the setting of unsanitary living conditions stems from repeated exposure to abnormal levels of lipopolysaccharides."

These are gram-negative pathogens that are getting foot holes and exposure to individuals that end lup developing SIBO. And in this case, in the low income countries, it's "via the contaminated soil and drinking water which abrogates the migrating motor complex leading to luminal stasis."

So, what they were able to show is that when you get high levels of gram-negative bacteria through exposure, and those gram-negative bacteria produce their LPS, that LPS drives an abrogation of the migrating motor complex and peristalsis which leads to the stasis of the bowel.

Even though we're not in a low income country (at least most people on this presentation aren't), we know that we are constantly swallowing gram-negative bacteria. So gram-negative bacteria coming from the mouth are being swallowed, your stomach acid is compromised, so they're getting into the small bowel in a viable state. You're not producing enough bile acid to maintain lower levels of them when you're feeding. And so, when you're feeding, you're feeding them. And when you're feeding them, they are generating LPS. And when they generate LPS, they drive leaky gut which ends up affecting peristalsis and the migrating motor complex. I'll show you how that happens.

"In animal models, E. coli"—E. coli is a gram-negative pathogen or an opportunistic organisms—the LPS derived from E. coli "has been shown to decrease both the frequency and strength of small intestinal contractions and to eliminate the migrating motor complex."

Just think about that... contractions are dramatically reduced, both the frequency and the strength of it. And the migrating motor complex, the MMC that's so important, is eliminated. That's in the presence of E. coli-derived LPS in the small intestine. And we're swallowing E. coli all the time. It's one of the most common fecal oral contaminants that we find in society today.

Now, how does this happen? Here's a study that looked at how exactly LPS causes this stopping of the bowel.

What they were able to show is that, when LPS is allowed to leak through a leaky gut, a leaky small intestine, the LPS gets into the enteric nervous system, moves up the enteric nervous system to an area right by the brainstem called the **dorsal vagal complex**.

The dorsal vagal complex is a centralized region where signals from the brain channel through that to get to the bowel to tell the bowel to move and to turn on whether it's the migrating motor complex or the peristaltic movement.

When the LPS gets into this dorsal vagal complex, it triggers an inflammatory responses that is mediated through an inflammatory cytokine called TNF-α. When TNF-α is activated, it creates enough inflammation and enough damage to the dorsal vagal complex that the signals from the brain to the gut, that are supposed to go to the gut, to move aren't making its way to the gut.

So, the LPS and the resulting inflammation that it has caused in the dorsal vagal complex has stopped and roadblocked the signals from the brain that tell the gut to move.

And what was interesting about this is it was not possible to elicit gastric motility via prokinetics. So think about how often we see people where the bowels are stopped, we know that because they have SIBO, and then they're given prokinetics and the prokinetics don't really help? That's because if you have LPS-driven stasis in the bowel, which I think most people with SIBO do through leaky gut, then even the prokinetics can't jumpstart the system because the signals from the brain, which is the source of the signal, are not making it to the enteric nervous system.

This is a follow-up study to the previous... what they found is when they bound up or inhibited the expression of TNF-α from LPS being at the dorsal vagal complex, they

were able to regenerate that kinetic signal to start peristalsis and the migrating motor complex.

So, it's the inflammatory response in the dorsal vagal complex because of the presence of LPS which leaked in because of intestinal permeability, it's that inflammatory response in the dorsal vagal complex that stops the signals from making its way to the gut.

So it would stand to reason that, if we could stop LPS from leaking through and entering into the enteric nervous system and making its way to the dorsal vagal complex, if we can stop that, we should dramatically help get the bowels starting to move again.

And leaky gut, LPS endotoxemia is an extremely common problem. We saw this in the very first publication that we did where we screened a little over a hundred college students. And these are normal, healthy students. They didn't have any conditions that they were reported. They were never diagnosed for anything. And yet 50% to 55% of them had severe endotoxemia that's represented by this type of response to food... meaning every time they ate food, this is time 0 when they came in fasted, and then we gave them a meal here, within the next five hours, you see this massive six-fold increase in the amount of LPS in their circulation. That means all of that LPS that had been generated in the gut and migrated past the intestinal lining is now floating around in circulation, making its way to the brain, up the brainstem, and so on. So, 55% of healthy normals have this.

So, LPS endotoxemia is super common—just as stress is super common and zinc deficiency and H. pylori infection and the use of antacids and PPI's. And unfortunately, non-alcoholic fatty liver disease and fatty liver disease are all also becoming more and more common.

So, all of these drivers that we know are dismantling the natural protective mechanisms that we have against allowing small intestinal bacteria to overgrow, all of these are extremely, extremely common.

And here's another underlying problem that we see. Because people with SIBO cannot handle carbohydrates—carbohydrates become extremely uncomfortable for them to consume because you get a lot of bloating and discomfort and distension in the body—a lot of times, SIBO people start shifting their dietary bulk from carbohydrates towards fat or protein. And the problem with this is that, with endotoxemia, the amount of LPS making its way into the system leaking through is increased based on the amount of fat that you consume in your diet—that's if your gut is not healthy. If your gut is healthy, you can be resistant to this, which we were able to show in this first publication.

But if your gut is not healthy, it's dysfunctional—which most SIBO and IBS patients have a dysfunctional gut—then the increase in fat intake in your diet is actually going to increase LPS, which means that more LPS is getting into the enteric nervous system, clouding up the signals from the brain, which means that it does not allow that individual's peristaltic activity and migrating motor complex to recover.

So, it's not a way of dealing with the root cause, the avoidance of food that create bloat, because that avoidance pushes you towards foods that will actually make the underlying problem worse.

[60:59] A Comprehensive Approach to SIBO Treatment

Kiran Krishnan: So, what would be a comprehensive approach to managing all the underlying structure/function issues within SIBO?

To me, in addition to targeting the overgrowth either with antibiotics or antimicrobials—and that's really a choice. In my view, I don't think you need to target the overgrowth first with antibiotics and antimicrobials, but some people still want to. Their doctors are happy to do it.

If you are doing that, in addition to that, it becomes important to address the underlying issues of stasis, of the bowel not moving, which is mediated by LPS and leakiness in the gut; also, the systemic TNF-α up-regulation and the central motility aberration that follows. That becomes important.

Prokinetics, remember, will not help much if the dorsal vagal complex is compromised by LPS and by leaky gut. **So to stop the recurrence of SIBO and let the bowels actually start moving, which is a critical part of protecting against SIBO, LPS endotoxemia has to be addressed** and how often is LPS endotoxemia being addressed in your treatment protocols for SIBO.

Low HCl and gastroparesis, the slowing down of gastric emptying, must also be addressed. And I hardly ever see these things being addressed when patients are being managed for SIBO.

Liver support is absolutely critical. We talked about how critical the liver is in terms of its bile production and the cleansing of bile and the recycling of bile and bile's ability to activate the FXR nuclear receptor… all of the roles that bile plays in maintaining a low level of bacterial growth in the small intestine. All of those jobs are extremely important. And they count on having a healthy liver.

And then, to reduce the risk of co-morbidities that come along with SIBO-like symptoms, mucosal damage and mucosal inflammation—that's the inflammation to the mucosa in the small intestine which inevitably gets damaged because of all the inflammation that goes on in the small bowel in people with SIBO and IBS. In order to reduce the risk of the development of co-morbidities from that damage, mucosal inflammation and rebuilding has to be addressed.

Colonic, saccharolytic bacteria, these are the microbes that can convert things like proteins and carbohydrates into really, really beneficial gut-healing short chain fatty acids, these bacteria in most people with SIBO have not had adequate food source because people with SIBO tend to cut most of their carbohydrates and vegetables and fibers and all that—which is what these colonic, saccharolytic bacteria need.

So, being able to re-stimulate the colonic saccharolytic bacteria with the right types of prebiotics and so on is also going to be important.

We mentioned the whole gastroparesis issue and liver support. One of the products that we had put together to support people with this dysfunction in the gut is a product called **MegaGuard**. And MegaGuard is so important because it has three major components in it that all address some of the key, underlying dysfunctions in overgrowth of bacteria in the small intestine.

Number one is **ginger root**. Ginger root accelerates gastric emptying and soothes out nausea and other discomfort in the gut. So, one of the issues within SIBO is a slowing down of gastric emptying. So this ginger helps move things along faster.

GutGard™ which is a liquidish flavonoid which protects the gastric mucosa and balances H. pylori levels, that's going to become extremely important as well because, remember, elevated H. pylori levels and its resulting compromised stomach acid production is likely a prevalent issue within this condition.

It's normal for H. pylori to be in your stomach to a certain level. But once it moves up and grows past a certain level, it becomes really problematic. And so, maintaining and supporting a healthy level of H. pylori is a really important part. And that's what GutGard™ does.

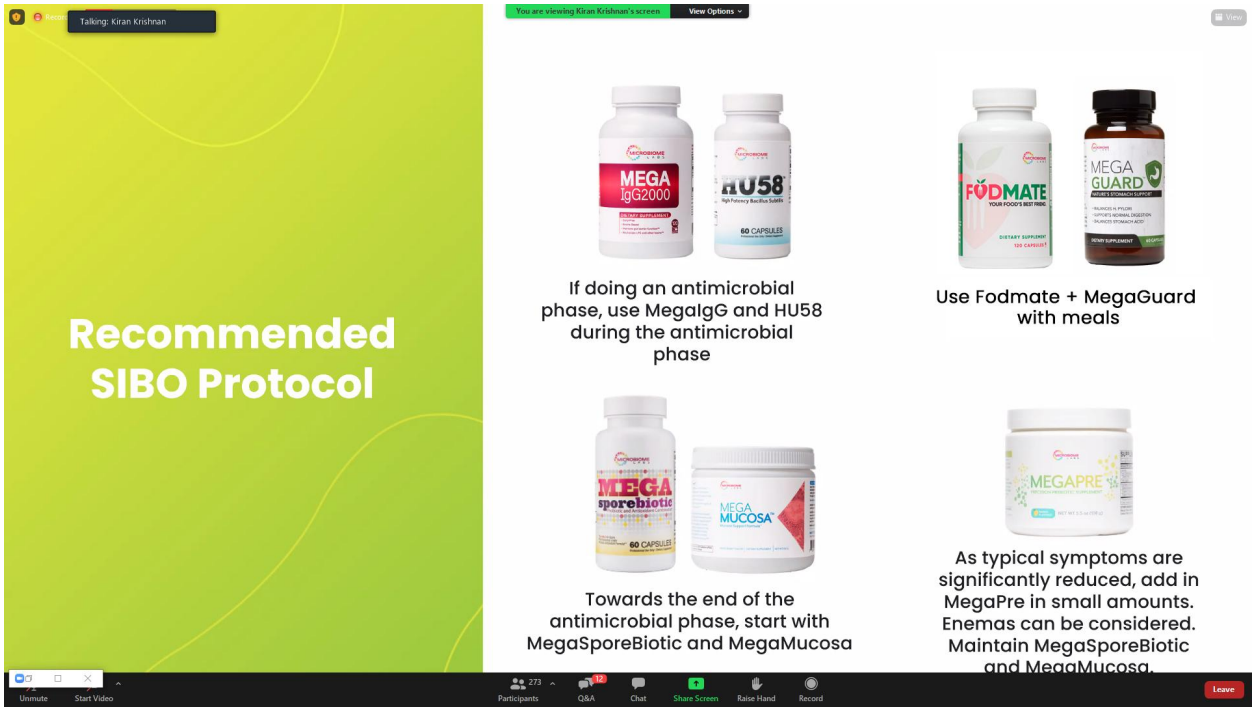
And finally, the **artichoke leaf extract** which is actually a prescription product in parts of Europe like Germany will stimulate bile production and balance cholesterol level.

So, with just this one product alone, you're helping address gastric emptying which slows down dramatically in people with overgrowth. It helps address the issue of imbalanced H. pylori and damaged mucosal lining. And then, it also helps address the issue of bile and bile secretion as well as balancing bile against other fatty acids.

So, this is one very important product that can help with supporting your SIBO patients.

[66:06] Recommended SIBO Protocols

Kiran Krishnan: And then, other recommendations...



Number one, using **FODMATE**. A lot of people who are suffering from SIBO and IBS and so on, they're very sensitive to FODMAPs in diet—FODMAPs are the fermentable carbohydrates—and so they go on a low FODMAP diet which means you're basically eliminating lots and lots and lots of healthy foods that a lot of your large bowel bacteria need. Now it's great to be able to consume those foods without all of that bloating and distension and all the discomfort feeling.

FODMATE is an enzyme product designed to actually break down FODMAPs in the stomach and then in the small intestine so that they don't cause a problem for the individual with bloating and distension and so on.

It's been one of our greatest successes in terms of launches. And we've been sold out of it almost four times since August or since July, since when we launched it.

So, FODMATE becomes a really important companion for when you eat because that will allow you to eat a broader spectrum of things, especially things like fibers and plant-based materials that provide of roughage and fibers. It allows you to eat without compromising and suffering from the consequences of consuming them.

You pair that with MegaGuard right off the bat with every meal. Remember, MegaGuard will help your gastric emptying, will help H. pylori balance, will help bile flow. That's all critically important when you eat food. Adding the FODMATE to it will give you a wider sense of what you can actually consume—including foods that are good for your large bowel because those microbes are heavily restricted and compromised when you don't eat lots of fibers and plant roughage and so on.

If you are doing an antimicrobial—or even if you're not, but especially if you're doing an antimicrobial—we always recommend that you start with **MegaIgG2000** + **HU58**.

MegaIgG2000 is an immunoglobulin product. And those immunoglobulins which are IgG formula immunoglobulins do bind up to things like toxins and so on that are released during a change in your microbiome.

And then, **HU58** is one of the key spores that we work with in Megaspore. What it's been demonstrated to do is it could be very powerful at competing against problematic organisms.

So if you've got problematic organisms that are being shaken up in your bowel because of an antimicrobial/antibiotic or whatever you might be on, you might want this HU58 to be considered because you want to ensure that the use of an antibacterial or antimicrobial of some sort doesn't favor the regrowth of opportunistic bacteria more—which often, it does. And so having this kind of protective strain in there will help mitigate the overgrowth of these problematic organisms.

And then, towards the end, let's say you did decide to do the antimicrobial, and you did it for three weeks or four weeks, certainly, towards the end of it, you need to start looking to **Megaspore** to start ceiling up the gut lining so that LPS doesn't leak through.

You need to look at the modulatory effects that the Megaspore blend has on immune response where it can actually reduce the severity of inflammatory types of responses in the body. We see it helping and supporting the immune system to deal with problematic organisms. We see a positive change in the microbiome in terms of diversity and the presence of keystone species when you start utilizing the Megasporebiotic.

And then, the **MegaMucosa** is really important to rebuilding the mucosal lining that inevitably gets damaged during a course of having and dealing with SIBO.

So, those two become extremely important as well.

And then, **MegaPre**, even though lots of people with SIBO get very paranoid when you start talking about prebiotics, if you are dealing with the other dysfunctional systems—the oral cavity, the presence of pathogens in the mouth, the lack of HCl production, the poor bile flow and bile recycling, the loss of peristaltic movement and all that—and you're starting to address all of those things, you can certainly start using small amounts of a prebiotic—in our case, about a quarter of a spoon, or maybe even less mixed in a large glass of water and sipped throughout the day.

That will provide some critical oligosaccharides for your large bowel bacteria that haven't had adequate food sources because you haven't been able to consume lots of carbohydrates and fiber. So, this is a really important start.

Now, there's another one I would add on here (which I don't think I have a picture of), **ZenBiome**. Remember, we talked about how stress is a big driver of dysfunction when it comes to HCl production in the stomach. Being able to manage stress, in our case using a **psychobiotic** we call ZenBiome which significantly reduces stress,

significantly reduces cortisol levels, improves sleep and disease, all kinds of positive impacts on the brain, adding that in can really help those that are dealing with chronic stress which is likely causing problems with HCl production.

So, this is really the look that I came up with when you consider SIBO and you really dig through the pathology. And what I found is that, in clinical practice, rarely are the other issues surrounding SIBO addressed effectively—liver function, HCl production, gut lining, intestinal permeability, the LPS issue. Rarely are these things all a normal part of people's SIBO protocols. And if you're not addressing these underlying root cause drivers, then the likelihood of overcoming these conditions become much, much less.

So that is my journey into SIBO. Of course, when I was doing it, I read probably 200 or 300 papers, much more than I showed you here today. This is an abbreviated version, so it's easy to understand. But the science is there. The science is pointing towards what the underlying root causes are of people that exemplify overgrowth in the small intestine.

And then, the most important part to me is those underlying root causes are also the root causes for lots of chronic illnesses. So just focusing on the bloat and going after that, and then not seeing a reduction in bloating two weeks or three weeks, creating discouragement for people that whatever they're doing is not working, that, we have to get away from. Unless we get away from that mentality, we really can't address the root cause effectively.

Shivan Sarna: Thank you! Thank you, thank you.

I want to just ask you a couple of specifics. Kiran, come on back on camera, handsome!

Do not think he's saying you need to take all those supplements all in one sitting or all at the same time or any of that. He's just showing you the line-up. So that is not what he's saying.

Thank you Kiran. That was very comprehensive.

[73:45] The Oral Microbiome

Shivan Sarna: A couple of really powerful questions based on your content includes: "What are we doing for the oral microbiome?"

So, just as a background, I have been working on these projects for years now. And thank you, Kiran, for diving in with me on the SIBO bandwagon. Kiran and I have talked about the oral microbiome on multiple occasions. And I will never forget it. I was with him in Seattle at the W Hotel at a convention. And he started talking to me about the mouth, and we talked about the toothpaste we liked and stuff. And you know when you get the tingle? I was like, "This has got to be related! Oh my gosh… I just really feel it's related."

And so, fast forward three years later, I have done the Dental Health Connection Summit based on that original spark—kind of because I also met Hal Huggins, sort of the Father of Biological Dentistry in the United States back in the '80s.

But anyway, what are you brewing for our oral microbiome sir?

Kiran Krishnan: Yeah! So, a couple of things… we have a product coming out hopefully by late Spring of next year which is a combination of an enzyme and flavonoid that you use as a lozenge. And what we've been able to show over a few years of studies is that it helps break down plaque formation in the mouth.

And why plaque formation becomes an issue is because, as plaque becomes layered and becomes deeper, you get different microbes that can grow in different layers. It becomes more and more anaerobic over time as the layers become thicker and thicker. So you actually start developing colonization, a higher density of these types of microbes in your mouth, and you start favoring certain types of

opportunistic anaerobic pathogens. And that ends up being a high predominance in your mouth when you have plaque building up to that level.

You also start to get lots of carries and all that of course because of the acid production and all that that we know of. But at, in itself, just breaking down and maintaining a low layer of plaque—you don't want to eliminate plaque. It is protective at a certain level. But maintaining that low level of plaque is really important in reducing the overall concentration of bacteria and the dysbiosis in the mouth itself. So that's one thing.

And then, we also have a version of this. This is the **Biocidin** spray. But we have one called **Megacidin** which is the same product with the spores in it. So we worked with BioBotanical Research on this product. And this, we use as an oral spray. And as we know, the BioBotanical ingredient in there provides some degree of antimicrobial function to keep the levels of bacteria low. But then the probiotics also get into the digital tissue and then the buccal immune tissue and helps stimulate immune response in the mouth's soft tissue to help your immune system control the growth of pathogens in there as well.

Shivan Sarna: Very cool, very cool! I need to let you go... thank you so much, Kiran, for everything. Happy holidays to you! We're looking forward to 2022 with you and the new product for the mouth.

I'll answer just some random questions here that are not Kiran related. But I know we've kept you over time. So I really appreciate it. I love you so much!

Kiran Krishnan: Happy holidays. Happy New Year to everybody! Thank you so much.

Shivan Sarna: Thank you! Love you. Bye bye.

Thank you, thank you. I want to ask you, if you would, type in to the chat some love for Kiran. We do cut and paste it and send it to him and our speakers.

[78:07] Prokinetics

Shivan Sarna: I did want to address a couple of things because we did get some consistent questions about prokinetics.

You know, I run a Facebook group with 22,000 people in it. I love it! And they're practically 24/7. And there's so many smart people in there that have become self-educated and educated through the summits and through the SIBO Recovery Roadmap Course... all of that!

Prokinetics can be incredibly effective, whether it's ginger, whether it's prucalopride, whether it is MotilPro. There are a lot of prokinetics that really do work beautifully. It's not a laxative. So you need to be aware of that. It is something that does stimulate the migrating motor complex.

I know he said that he has seen them not work. That's true! They don't work for everybody. But they do work for a lot of people, so I don't want anyone to be discouraged about that.

Richard is asking: "Does the antimicrobials in the Megacidin kill off the probiotics in the formulation?" That's a great question. Kiran is not really in the business of killing off the good part of the formulation. I see where you're going with that. But I would imagine they've already figured that part out.

LDN is a weak prokinetic. And it's amazing for people's immune system. But what I've seen based on all of the people I've talked to (which is hundreds now about these topics), LDN combined with another prokinetic is really a great combo. And LDN is low dose naltrexone.

If you want more information on it, you can go to LDNResearchTrust.org. It changed my life! I had psoriasis, and it cleared my scalp. If you know anyone with psoriasis in

their scalp, they call it *heartbreak psoriasis* for a reason. Try being on TV with that. It sucked!

So, it's a miracle. You have to do it properly. It could give you vivid dreams. But that's actually a sign that it's working. I take mine in the morning. You can find out more about it in the SIBO SOS® Facebook Group.

[80:40] Rapid Fire Q&A

Shivan Sarna: That artichoke, you got to try it. You got to experiment with it. If it appeals to you, it's a miracle for some people…

That's the thing about SIBO. The underlying causes that he was talking about was that bacterial overgrowth obviously. But remember that, from food poisoning, from Dr. Pimentel, he has shown that when you've had food poisoning, not everybody, but many people, it creates confusion in the intestine through molecular mimicry, it slows down the migrating motor complex which leads to the bacteria hanging out in the small intestine and overgrowing. The MMC, the migrating motor complex, is that sweeping motion, he calls it the crumb-cleaning wave—that was a mouthful. And it's very, very important that you understand what it does.

"How can you tell if your prokinetics is working?"

Well, it's that the SIBO doesn't come back. It's complicated, I know. But if you haven't addressed your underlying cause, and you do the prokinetics, your SIBO still might come back.

I have to tell you this story. On January 15th or 16th, Dr. Allison Siebecker, world renowned SIBO specialist—a friend of Kiran's as well—she and I are doing a webinar, one for pros and one for patients about several things that people aren't getting right about SIBO. And she and I have been working on it for weeks now. We periodically do

them when we launch the SIBO Recovery Roadmap® Course. Whether you want to take the course or not, you should still come. Or if you want to take the Pro Course if you are a professional, you should come to this webinar. It's going to be fantastic!

So Dr. Siebecker and I were talking. And we're going to tell the story again because it was profound. We were speaking to another gut health expert. And he said to Dr. Siebecker, "It's like you have a chart with everything that works!" He was saying that he feels like nobody is really getting SIBO right. And he's like, "The way you two are talking is like you have this chart and you have a list of everything that works." And she and I looked at each other, and we're like, "But we do! It does exist. It absolutely does exist."

Sidenote: Download the SIBO Recovery Roadmap Protocol Chart for FREE here.

It is the algorithm that Dr. Mark Pimentel started and that Dr. Steven Sandberg-Lewis and Dr. Allison Siebecker added to. It's on page 110 of my book. It is on SIBO SOS® for download. It's the basis of the SIBO Recovery Roadmap® Course. We're going to go over it on the 15th and 16th. I hope I'm getting those dates right. It's mid-January. Expect it in your emails.

But what I love about what Kiran was just talking about is the liver, the bile—why do you think I'm doing the Liver & Gallbladder Rescue Summit in the Spring? It's because of what he was talking about. That is so important. If you don't get that part right, the rest of the treatments might not work.

If you get those treatments right, and you get your liver and gallbladder taken care of with your bile balance and all that, and your stomach acid, you are just setting yourself up for success—is what I have observed as a fellow patient, as someone who is deeply enmeshed in this topic and talking to thousands and thousands of people in the Facebook Group and hundreds of experts on this.

So, I was really excited that he talked about that. And know that one of the underlying causes can be food poisoning from what we just talked about. It can also be

adhesions. Adhesions are internal scars. Well, it's actually a scar that is from a horse kicking you in the belly, or the seatbelt digging in from a car accident, from a caesarian section. Collagen forms internal scars that hold you together which is a miracle. And it makes adhesions. But that can even pull your intestines out of place and impact the migrating motor complex. So it's multi-faceted, right?

There are resources, there are tons of free things that we have at SIBOSOS.com and SIBOinfo.com.

This is my book, Healing SIBO. It's $20 on Amazon. There you go! There are recipes in there and stuff. It goes over that whole protocol I was just talking about. And if you can do that in conjunction with what Kiran was talking about, and get your vagal nerve balance, you're just continuing to increase your chances of becoming SIBO-free and/or at least managing it in such a way that it doesn't get worse.

Maybe you have an underlying cause that can't be resolved. Doing a pulse of periodic healing along with rebalancing your microbiome is magnificent.

Now, I had something else I just quickly want to talk about. I had a sign. I literally had a sign. Hold on! I had to reorganize my office… here it is! You ready?

Breathe.

There is something that I have nicknamed "SIBO panic." I want everybody, especially at this time of year, to breathe. There are answers. I swear to you. I promise you. No one has had more SIBO panic than I have. Do you know what it's like to be on national TV and have people write you on Facebook—this was a long time ago before Facebook was so popular—"Shivan, you look glowing! When is the baby due?" while you're wearing two pairs of spanks?

I've been so sick that I stuttered because my brain fog was so bad I could not speak. I have been truly terrorized. I get it! And I have also come to feel a hundred percent better… a hundred percent better!

Remember, for those of you who are like, "I don't know if I'm ever going to get well," just keep this in mind that a managed chronic condition can make you feel a hundred percent better than an unmanaged chronic condition.

My company is called *Chronic Condition Rescue* because when I started this project back in 2016 or 2017... oh, my gosh! I had terrible psoriasis (again while I'm trying to be a pretty lady on TV), my hair was thinning, I had such bad bloating, I had alopecia (that's the hair business), I had mold poisoning from being in a building that was moldy for 20+ years. Oh, my gosh! My inflammation in my body, a CRP level—if you're not familiar of that, it's an indicator of inflammation—was as if I had a broken leg.

So, I get it... I really get it. And I promise you... there are answers!

Wouldn't it be great even if you could feel 20% better? Like seriously? Of course, I want you to feel 100% better. But know that there is hope. There are answers. Do not let anyone tell you that this condition is constantly unresolvable because that's just not true. If you do the due diligence, you'll find what's going on with you.

And maybe you have an underlying condition like an adhesion that you can't resolve, or scleroderma, or something horrible like that—God bless—there are still ways to feel better.

So, is mold toxicity an underlying cause? There are people that really feel that it is an underlying cause. There are people who feel like, "Well, if it's not an underlying cause, it's such an inhibitor to being well that is very hard to resolve your condition until you resolve the mold or do it at the same time." There is a phenomenal masterclass we have at SIBO SOS® under Courses that's $59 by Dr. Ami Kapadia on mold resolution. She sees a lot of SIBO patients. That was an amazing, amazing class.

There's a treasure trove on SIBOSOS.com under Courses and the masterclasses that we've done. It's $59. Get in there and check them out!

There's a masterclass on Ehlers-Danlos which is the collagen disorder, hypermobility, with Dr. Alena Guggenheim. We have one from Dr. Leonard Weinstock on MCAS and rosacea and restless leg and histamines. We have on mold. We have a couple on Lyme. Fantastic! We have two on SIFO, small intestine fungal overgrowth. So, check out the SIBO SOS® Masterclass Vault.

Everybody, take care. Thank you!

"Any recommendations for liver support?"

So, KIran's MegaGuard is great for that, as are dandelion—I'm not a doctor. I'm just giving you suggestions that I know of—and TUDCA.

If you have liver issues, please, we will be getting you signed up for the Liver & Gallbladder Rescue Summit that comes out in March starting in January. And when you sign up, you'll get some of the free classes right away. So be sure to sign up for that summit.

Okay, I'm going to wrap up! But I did want to wish you all the best. Thank you so much for being here. You're always on my thoughts and prayers and in my heart and on my mind.

And I also just want to take this opportunity to thank my team who is so devoted... so devoted to this cause. Just know that 2022 holds a lot of promise.

If you're a prayer warrior like I am, pray for Dr. Pimentel to make the discoveries he needs to make, and for Kiran and his discoveries, and Datis Karazzian with the vagal nerve work... and on and on and on...

There's one other thing I have to tell you about... when you go to SIBO SOS® and you go to the Courses or the Vault, let's say you've tried everything, you're like, "Shivan, I've tried it all! I've tried rifaximin, I've tried neomycin, I've tried prokinetics. I've tried it

over and over and over again. I have a great SIBO specialist. It ain't working! Nothing is working! I know what my underlying cause is. And it's still not getting better."

Remember, it could also be parasites because those symptoms mimic SIBO. It could also be SIFO, small intestine fungal overgrowth.

You've got to watch Dr. Satish Rao's class if you think you have a fungal overgrowth. Dr. Anne Hill talks about parasites in a beautiful masterclass. So that's all at SIBO SOS®.

But we also have another summit which is called *Next Steps for Treating Tough SIBO*. And what that was was something that Dr. Siebecker wanted to put together because—well, she is the biggest proponent of the rifaximin, the neomycin, the prokinetic, the formula. She and Dr. Steven Sandberg-Lewis at the SIBO Clinic in Portland—it doesn't exist the way it did. But they were literally doing SIBO breath tests before, during treatment, and then after. And they saw what worked. And that's what is so powerful when it comes to that roadmap because it does work. They have seen it hundreds of thousands of time.

But you have to do it in the right order. And you have to perhaps support your bile, perhaps support your stomach acid.

Sidenote: Download the SIBO Recovery Roadmap® Protocol Chart for FREE here.

So, it's complicated. How long did it take for you to get SIBO? Did you get it yesterday? No. It's one of those things where how long did it take for you to get in debt? Well, it takes a long time to get out of debt. It's one of those. And I hate to say it because I'd love to say it's all quick and easy!

So, consider all of that. Hang in there! I hope you have a beautiful holiday season. I know it's already almost done. But I just wanted to point out that it's a really tough, emotional time. There's a lot going. So give yourself a break… seriously!

Breathe. Don't take it too seriously if you can avoid it. I know what it's like to feel terrible. Don't get me wrong! But don't let it rob you of the joy that does exist, that can be harvested, that can be shared. I see it every year now in the Facebook Group. Ninety-nine percent… glorious! But there is a little bit of bitterness that sneaks in during this time.

I think it's because we're all reflecting. We don't want to go on to another year feeling a certain way. People tend to get very cynical towards the medical community and things like that. Don't let anything get you down. Just don't! I know it sounds easier said than done, but there is so much hope. You just need to breathe step by step. Inch by inch, it's a cinch, okay? I promise! I really do.

Alright! Happy holidays. Namaste everyone. Thank you very much. Bye everybody!