

[#63: Dr. Jill interviews Kiran Krishnan of Megaspore](#)

Dr. Jill 00:12

All right. Hey everybody! Thanks for joining us today. I am so excited to have my friend and brilliant entrepreneur, Kiran Krishnan, here from Microbiome Labs. We're going to talk all things gut health and probiotics today. You guys have heard me talk about spores for many, many years.

Dr. Jill 00:33

I'm going to introduce Kiran in just a moment, but I want to tell you really quickly how my history relates to this because 20 years ago I was diagnosed with Crohn's disease, and I didn't have a clue at the time. I remember my doctor telling me I had to have surgery, steroids, and immune-modulating drugs. And he said, "Jill, diet has nothing to do with it." I remember I was a third-year medical student, so I didn't know a whole lot, but I knew that didn't feel right. That didn't make sense. I didn't feel like I had all the answers, but I was going to find them. And I dug deep, came across a specific carbohydrate diet, and I made some changes and within two weeks, my fever and my symptoms were gone. Now it took me probably two years to heal from Crohn's and I consider myself today completely healed, 100% cured. I'm not in remission; I'm cured. And people kind of balk at that because they're told it's incurable but I'm living proof.

Dr. Jill 01:25

Now, what does this have to do with probiotics? Well, Kiran, I don't know if you even know this, but back in the day, I remember *Bacillus coagulans* and I was like: "I don't know what this is, but this is the only probiotic I can tolerate." Back then, there were not many on the market. I remember thinking, "Okay, whatever the *Bacillus* thing is, this is the one." I have literally been on spores for 20 years, and it has been a game changer in my health and in my whole gut. Even now, on the toughest guts, I always go to spores.

Dr. Jill 01:54

Now, we're going to dive in today. I cannot wait to talk all things spores and the latest research. But I wanted to kind of set it up because I have always been a fan of

yours. I've always been such a big proponent of MegaSpore. I spoke for you guys. I continue to share the word and of course, we sell your products. I'm such a fan, partially because my own story of healing is so intricately related to spores. So I wanted to share that.

Dr. Jill 02:18

Let me introduce my guest. Kiran Krishnan is a research microbiologist and has been involved in the dietary supplement nutrition market for the past 18 years. He comes from a university research background, having spent several years with hands-on R&D in the fields of molecular medicine and microbiology at the University of Iowa. Kiran established a clinical research organization where he designed and conducted dozens of human clinical trials in human nutrition.

Dr. Jill 02:43

He's also a co-founder and partner in Nu Science Trading LLC, a nutritional technology development research company. He's also co-founder and chief scientific officer at Microbiome Labs. He's a frequent lecturer at the Human Microbiome at Medical and Nutrition Conferences—I've heard him; we've been in the same circles for quite a while now—and an expert guest on national and satellite radio. He's appeared in several international documentaries and [has been] a guest speaker on several international health summits as a microbiome expert.

Dr. Jill 03:17

Kiran, you're one of my favorite people to talk to because you just bring it down and bring the research. What I'm seeing in clinical practice [is that] you bring the pieces. I always like it when I hear your lectures or we talk. It makes so much sense because it fits into clinical practice. So first of all, welcome! Thank you for taking the time to talk to me here.

Kiran Krishnan 03:35

It's an absolute pleasure. Thank you so much for having me. It's an honor. I adore you. I'm a big fan of yours as well and [have] always enjoyed listening to you speak, so I jumped at the opportunity to have this conversation together in front of other people. It's super exciting and it's an exciting time that we live in. There's so much going on in the world today and there's so much going on in science, medicine, and health that it's mind-boggling. For nerds like us, it's the day you wake up and you're

like, "What the hell is this? We just discovered this?" It's mind-boggling to me what's going on in the world today.

Dr. Jill 04:12

And the probiotic research is exponentially... Back two decades ago, when I started into it, there was not that much and it has just exploded. And you and I know how it relates to the heart, obesity, diabetes, mood disorders, sleep disorders, and testosterone deficiency—things that you would never think. But the science is just now catching up with what we've seen and known to be true and there's so much out there. What I want to start with before we dive into spores and what's the latest is: How did you get into this? Obviously, you had a research background, but tell us your story about how Microbiome Labs came to be. And what was your role in that?

Kiran Krishnan 04:48

Yes. I always kind of played a role behind the scenes because I did research for companies. I consulted for a lot of companies, helped them formulate products, and helped them put together the science—always in the background. Never did I think we would have a brand of our own that's out there in the marketplace, but it really was born out of a need that existed. We were actually hired by a large multinational company that's in the dietary supplement space back in around 2010. So they hired our research and technology development company and their goal was for us to identify for them: What is the next generation of probiotics? What is working in the industry? What's not working? Do they need to be refrigerated? Do they not? Is it 100 billion? Is it 200 billion? Where is all of this stuff going?

Kiran Krishnan 05:44

They really wanted us to boil down which of the approaches on the probiotic side made sense and which didn't. So we went through two and a half to three years' worth of study on the probiotic marketplace. We tested products. We looked for the survivability of the products that are sitting there on the shelf or in the refrigerator, whether or not they can make it through the gastric system. We looked at efficacy studies. We looked at all kinds of things. We did a deep dive into the research to figure out: Is there a rationale for going 100 billion?—for example. A new product just came out and it's now 150 billion. What's the rationale behind that? Why is it 15 strains? Why not one? Why not two? So we dug into all of that.

Kiran Krishnan 06:30

Really, what we came up with was that there was a lot of nonsense in the industry, to put it lightly. Companies were being driven by the market. And the way they came up with 100 billion is that the closest competitor had 80 billion and they wanted to be 20 billion more, so it looks better. And the way they came up with 15 strains is that the closest competitor had 12. So it just became a race up the mountain for the biggest and baddest product in that sense. Then the refrigeration thing was a difficult thing because most of the refrigerated products didn't even really survive through the gastric systems so it didn't really matter. There were so many issues like that.

Kiran Krishnan 07:11

Then we started thinking: "Okay, if there's a lot of issues with what people are using as probiotics, are there actual probiotic bacteria out there that meet the definition?" The scientific definition of a probiotic is that it's a live microorganism [that], when administered in adequate amounts, confers a health benefit to the host. So it has to meet all of those criteria. It has to meet a) [the requirements of] a live organism and b) [be] administered in an adequate amount, so you have to be able to dose it specifically. And then it has to confer a health benefit to the host. Most probiotics on the market fail the first step, which is not live organisms. There were no dosing criteria that made any sense. And then most companies didn't prove that their finished product had any health benefits for the host.

Kiran Krishnan 07:54

So we said, "Well, what kind of bacteria could actually act as a probiotic?" And then, being a closeted evolutionary biologist, even though I didn't study evolutionary biology, I always looked to nature and [would] go, "Okay, where did our ancestors get bacteria from? What did they eat frequently that gave them microbes?" And you come to find out that they ate dirt, really. They ate off the land. They didn't sterilize their food, water, and all that. So they got a lot of microbial exposure from their environment. That, however, is too simplified because what it makes you conclude is: "Oh, okay, soil-based organisms. Let's just grab a bunch of those and that's now a probiotic." Well, it's not that simple because the vast majority of organisms in the soil cannot survive through the gastric system. The gastric system is there, acting as a barrier to prevent that from happening.

Kiran Krishnan 08:46

So we started going in and going: "What organisms are ubiquitous within the environment that we would accidentally swallow every day but also have the unique capabilities to survive through the gastric system and make it into the intestines alive so we can meet at least that first part of the definition?" And that's where we came up with the spores because they have this really unique coating around them, the spore coat, that protects them from harsh environments like the outside world and through the gastric system.

Kiran Krishnan 09:15

So we said: "Wow, okay, these are amazing." These are Bacillus endospore-forming bacteria. They meet the biggest part of the criteria. Humans have been consuming them for millions of years, so we've got a commensal relationship with them. They survive through the gastric system. We can document the dosage of these even upwards of a couple of million years ago. And we started digging into it and we found they've been used in the pharmaceutical industry since 1952. One of the first prescription probiotics launched is Bacillus clausii, which is still on the market today since 1952 [and is] used for treating dysentery and upper respiratory tract infections.

Kiran Krishnan 09:55

So we were like: "Okay, amazing! Nobody's using these in the US supplement industry. This is the next generation of spores." We went through and figured out all the right spores, where to get them, and all of that. Then we came back to the company. This is two and a half, three years later, and we said: "Okay, guys, we figured it all out. All this stuff is nonsense here. Here are all the reasons why it's nonsense. Here's your new generation of probiotics." In fact, we basically handed them the formula for MegaSpore and said, "This is the next big thing." And here are the studies we would do because of it.

Dr. Jill 10:27

Yes. And, Kiran, I just want to be sure. Did you say two years or was it longer?

Kiran Krishnan 10:32

It was about two and a half years, yes. It was closer to three years at that point, so it was really kind of 2010 to about the middle or end of 2012. We came back and at the

time it seemed extremely disappointing, but they said, "You know what? We just got acquired by a large company. This is really interesting stuff, but no thanks." We were like, "What the hell? This is so important!" Then we became so impassioned about it because now we knew that most of the stuff people are buying is just crap. It's not doing anything. This could really help them. So somebody please do something with it.

Kiran Krishnan 11:12

We called up all of the companies I've worked with in the past, the large companies in our field, on the retail side. And one after the other, they kept passing. The biggest thing that companies couldn't wrap their heads around, which they had a really hard time [with], is [that] we were recommending a dose of 4 billion CFUs a day. They were like: "How am I going to sell 4 billion? My top-selling probiotic is 30 billion. How am I going to tell my consumers that you have to pay the same for 4 billion?" We were like, "Because it's not the quantity. It's irrelevant." And they were like: "No, we can't do that. It doesn't make any sense." So everyone kept passing on it. And then we were like: "Okay, I guess nobody's going to launch it. We'll go on to the next project." But Tom and I, my business partner, kept going back and forth and going: "This is too important. We can't not get this out there." So one day we just—

Dr. Jill 12:00

And had you met Tom through the research or had you known him for a long time?

Kiran Krishnan 12:04

Yes. At that point, I'd known Tom, I think for about five or six years. Actually, it is kind of through the research because, in my other company, I was working with a doctor. His name is John Abernathy. He's a seasoned research professional associated with the University of Florida. John and I had been working together for like 10 years before that, doing studies together, and John always told me: "My good buddy from high school, Tom, lives in Chicago. You guys have to get together. You guys think about things in the same way. It's so similar." He kept encouraging us. So finally, Tom and I got together for lunch and immediately we were like: "All right, we get it. I think we're going to do something together."

Dr. Jill 12:46

Yes, totally. The same mind.

Kiran Krishnan 12:48

Yes, the same mindset, the same motivations. And we worked on a few projects together. They didn't really go anywhere. But then, when we had the spore thing, we were both like, "This is too important." And Tom, being a practitioner at the time, was practicing almost full time; he's like: "I can't use any of the probiotics now—now that I know all this stuff." He's like: "I'm done. I'm done. I'm just going with the post-biotics." He was using that Sagan stuff all the time—the really expensive post-biotics. That's all he was focusing on. So we decided together and we were like: "All right, we just have to do this. It'll probably fail. We don't know what the hell we're doing." [inaudible].

Dr. Jill 13:26

Oh, I love it!

Kiran Krishnan 13:28

We basically had \$80,000 to start the company.

Dr. Jill 13:33

Oh, I love it!

Kiran Krishnan 13:35

That's it; that's all we had. So we sat together and we go: "Okay, how do you market a product? Like, what do you do? Do you buy a Super Bowl commercial?" We have no idea. So we said, "Okay, let's go to what we know." Tom's a chiropractor, so we were like: "Okay, we know chiropractors. We know how they think. We know how to talk to them. So let's just go to chiropractor shows, do lectures, and start to get the chiropractors excited about this new concept."

Kiran Krishnan 14:05

The only place in the US where chiropractors have to be in a seat to get their CEs is in Florida. In every other state in the country, they can do it online so the shows aren't well attended. So we honed in on Florida and chiropractors. That's it. So for our very first show at the Florida Chiropractic Association, we got a booth and we had this nice display. We were standing there—two guys trying to talk to people,

trying to get people's attention. People were just walking by and didn't know what the hell we were talking about. None of it's making sense to people.

Kiran Krishnan 14:39

So we decided, "All right, we've got to do a lecture." And, of course, nobody knew who we were. So we couldn't get on the actual speaking roster. So we said, "Let's do a lunch-sponsored lecture. Let's invite some of these chiropractors to lunch. We'll pay for the whole thing." And then the FCA said, "Okay, fine, you guys can do one lunch-sponsored lecture." So the first sponsored lecture we did, we spent about \$6,000 on the whole thing. That's almost 10% of our entire budget. We showed up. We were all excited. Two people showed up to it. We were like: "Oh crap! We are going to be out of business so soon."

Kiran Krishnan 15:16

But here's the good news about that: We did the lecture and one out of two bought into the product right away and got it and all that. We were like: "50% conversion! Yay!" We were super excited. He was our first customer and he still buys products till today almost regularly—almost every two weeks. So then we were like, "Nope, this is the right move. Let's go to the next show. Let's do a sponsored lecture. Let's get people to the place. Let's run around the show, just roping people in the lecture." So for the second one we did, we had about 12 or 13 people. Then, for the third one we did in July, we had about 15 to 25 people. And then people started talking about it because we were doing a very compelling lecture that was titled "Forget What You Think You Know About Probiotics".

Dr. Jill 16:02

Oh, I love it. I just want to comment. Knowing you guys from the outside—we've known each other a long time—your sense of integrity is always there, [as is] your sense of purpose and drive by the right things. And people are drawn to that. That's what I love about you and about the company. And then the other thing is that you had amazing science behind you. You knew you had a hole-in-one; it was just a matter of getting that information to the public. You can keep going. I just want to comment so people listening know what I've always seen. And that's one reason why I've aligned and spoken for you guys all over the place, because I so believe in your mission, your product, and who you are as human beings.

Kiran Krishnan 16:40

Thank you so much. And we wanted to change the game. One of the things that bothered us the most about most probiotics out there that people had access to was that companies just didn't do research on their finished product. That was mind-boggling to me—how you wouldn't want to do studies to know what your product does. You have to know that. So we were itching. We couldn't wait to sell enough so that I could work out a deal with the university, get a study going, and get our first study done. So we just plowed through that way. We went to every show we could afford to go to. We did lectures anywhere we could. We did dinner lectures around the Chicagoland area, and it just kind of swelled.

Kiran Krishnan 17:24

It was a very grassroots effort. We never took in investment money or any of that. It was completely grassroots. We went from \$80,000 to much more than that in a few years, just following through with passion to teach people that there's a better option out there and that this approach is not really working and we've got to look at things differently. And then, of course, it became extremely exciting for us when we could start partnering with people like yourself, who could get the word out there to people who are known, recognized, and respected. It's been a really mind-boggling journey. And if we think back just three years, even three years ago, I think we had something like 36 employees; now we have like 110. It's been crazy, but it's given us the opportunity to invest in research. We've now published, I think, 12 studies, and we've got about six others ongoing right now. And we're initiating five new studies. So it's amazing. We're living the nerd fantasy dream.

Dr. Jill 18:42

I'm so excited because I've never really heard [about] your whole journey. I jumped in, probably about '15 or '16. I don't know when it was; somewhere in the middle there. So I love that. And again, the beautiful thing is your passion, the truth behind your product that really worked, and then clinical efficacy. All of us who are out in the field know because we see that all of a sudden there's something different. Just like my Crohn's experience 20 years ago: "I don't know what this thing is, but it's different." I had no idea, which again is why I'm so partnered with you and with your mission, because I knew before I knew what it was that there's something different

about this probiotic. First of all, your keystone product, MegaSpore, has been such a great hit. So many of my patients take it successfully.

Dr. Jill 19:28

One of the things that always struck me as I was teaching and when I saw your data on the diversity... I always say that diversity is king. If you're listening here and you don't know it, I always talk about back in the Irish potato famine, where there was this blight and all the potato crop was wiped out all across the land. It was because all the farmers chose one seed. It was a best-yielding product. They planted all the same thing, and then that blight wiped everything out. The same thing with your gut flora. If you don't have a number of species and lots of diversity, that creates resilience. And that really is the core of overall health and resilience: Diversity in the microbiome.

Dr. Jill 20:04

Now, we're going to talk about spores in a second and how they affect that but what I want to say is that there have been things that have been leading up to this, like the chemicals in our soils. Our soils are a reflection of the microbiome. I come from a farm and my brothers are all still on that farm and we always reflect on how the dysfunction and depletion of the soils actually start to reflect the microbiome. So often, our babies are born into the world with a less diverse microbiome and they're just at a disadvantage. So when I think about "What can increase diversity?" of course foods and variety can, but let's talk a little bit about MegaSpore and how it affects diversity because this is something no other probiotic that I've ever known can talk about or can claim.

Kiran Krishnan 20:43

Yes, absolutely. And we were very thrilled when we were able to show and prove that it did. We hypothesized for a while that it did but until we had the data, it was hard for us to really go out there and really talk about it. The idea behind probiotics helping with diversity always came from this idea of seeding the gut with all of these bacteria that are in the capsule. So people kept saying, "Well, that means you just need more of the different bacteria in the capsule. Then you're going to get more and more and more diversity." And the response to that is no, because you're talking about one genus here, lactobacilli typically or bifidobacteria. Your gut has 200 to 300 different genera. What about all those microbes?

Kiran Krishnan 21:28

So really, how we came about the idea that there's a likelihood that the spores can impact diversity is because of the way the spores function within the gut microbiome. They have this unique modulatory effect where they can go in. They can read the environment within the gut and they understand where to start tweaking balances among organisms. If there's an overgrown and problematic organism, they know how to sit around that organism and bring it down. They do it differently with different pathogens.

Kiran Krishnan 22:00

I'll give an example. Let's say it is something like strep and there's an overgrowth of strep within the gut. The spores will sit around the strep and actually produce an antimicrobial that the strep can't handle so it'll actually bring down the growth level of the strep. Now, let's say it's C. diff. We did a study on Clostridium difficile in the cell with Cleveland Clinic. What we found was that the spores will sit around the Clostridium and they don't create an antimicrobial because they don't have an antimicrobial that will affect the Clostridium. Instead, they chelate iron away from the Clostridium. So they use a chelating agent that they produce. They secrete that into that microenvironment and it starves the Clostridium because the Clostridium needs iron for its metabolic function.

Kiran Krishnan 22:45

It's mind-boggling when you think about that. Think about this bacteria going in, first of all, being able to identify problematic bacteria in a sea of trillions, then honing in on that one, and then knowing based on what bacteria that is what tool to employ in order to control it. Because it has that kind of intelligence, a kind of intelligence that we don't have about our own gut—our immune system finds it hard to do that kind of modulation—we hypothesize that if they can know which microbes to control and bring down, they can likely do the opposite, where they can understand the underrepresented organisms and find ways to bring them up. And sure enough, they do that.

Kiran Krishnan 23:31

So diversity is not only a factor in how many organisms there are but it's [also a factor in] the uniformity among the organisms as well. And depending on how you

measure diversity, some indexes will try to favor really low-represented organisms so you can get a better diversity score. If you're below a certain prevalence level, they don't even count you as [inaudible]. So if the organisms are at really low levels, it's almost like they're not there because they're not functional. So then the spores get in, and they see these poor organisms trying to struggle and raise their levels up. They'll sit around them and they'll produce compounds that help them grow. At the same time, they'll compete with the organisms that are competing against them.

Kiran Krishnan 24:18

So they'll change the environment, modulate it and do all of this amazing orchestration to bring back diversity within the microbiome. And you think about why the hell they do that. How do they do that and why do they do that? It's a really mind-boggling thought that they can do this for us. And it comes down to something called symbiogenesis. Symbiogenesis is a forced co-evolution of different species that coexist and are forced to coexist, so they find a symbiotic way of functioning.

Dr. Jill 24:54

Is that in the realm of when we talk about quorum sensing?—because that's the word that's coming to mind. The same idea. Do you want to describe what that is to our listeners?

Kiran Krishnan 25:01

Yes. So quorum sensing is how the microbes can actually read each other's signatures. That's one of the ways that the bacillus will know who is there and what number.

Dr. Jill 25:11

Like a business card or something where they exchange their numbers and are like: Hey, who are you, and what are you doing here?

Kiran Krishnan 25:19

Totally. And not only can they tell who is there, they can [also] tell how many. So it's quantifiable for them too. They can, for example, look and go: Oh, there's a pathogen there but there aren't too many of them so we're not going to bother with

those pathogens. In fact, individual strains use quorum sensing as a way to mount an attack, for example.

Kiran Krishnan 25:41

Take Listeria. Listeria is a food-borne bacteria, the Listeria monocytogenes. But you can get exposed to Listeria and not get sick because you didn't get exposed to a threshold level. If you get exposed to a certain level, once the Listeria gets in the gut, they all start talking to each other, and they go: Okay guys, are there enough of us here? Yes, there are. Okay, now everyone, turn on your virulence genes. Turn on your toxins genes because there's enough of us and we stand a chance. If there aren't enough of them, they don't turn it on. And they're reading each other's chemical signatures so they know exactly how many of them are there.

Kiran Krishnan 26:19

So quorum sensing is a really important language that the bacteria has. And then there are some researchers that are trying to figure out how to listen in on the quorum language.

Dr. Jill 26:28

Like conversations, right?

Kiran Krishnan 26:29

Totally, yes, because there are bacterial conversations happening.

Dr. Jill 26:32

One thing you mentioned... For people who are listening who maybe aren't super into the microbiome like you and I are, I want to go back to clostridia. So if you're listening, you may have heard someone with C. diff. colitis or some sort of clostridia infection. What this is is basically that as we take antibiotics and destroy some of the good guys in the gut, we all have some clostridia, and some of them are very good and healthy, but there are certain strains like C. diff or Clostridium difficile that can actually cause colitis or a severe illness. Older people often die of this illness. It usually is antibiotic-induced or iatrogenic, as we call it, or doctor-induced, because they've been given too many things and it depletes the diversity so badly.

Dr. Jill 27:11

And spores—I always call them tulip bulbs. When people are talking about spores, I'm like: "It's like bulbs. They sit dormant in the winter and then they blossom." I want you to talk [about] the more technical terms about how this spore actually doesn't need refrigeration and why. But again, in my simplistic form, I tell patients it's like tulip bulbs because they stay dormant.

Dr. Jill 27:28

And again, in my very simplistic non-research mind, I'm like: Well, spores and spores are going to be the best instigators of warfare against each other. If we have a spore of clostridia, it's resistant to antibiotics, so it stays there and causes illness. Why not use a healthy, good spore like some form of Bacillus to actually be the counterattack there? And it sounds like that's what you're saying.

Dr. Jill 27:51

One other interesting thing is that, as we have lots of glyphosate and Roundup in our environment, glyphosate preferentially kills some of the good guys, the other probiotics like Lactobacillus and Bifidobacterium species and actually allows clostridia to proliferate. We've seen this in both horses and pigs, cows, and other animals in their guts, where they actually have a cow version of C. diff colitis because of the Roundup and the glyphosate on their feed. So we're seeing that in humans as well.

Dr. Jill 28:18

So two things I want to talk just a little bit about: Why don't they need to be refrigerated? And if that makes sense on the clostridia, like you were saying, of why that might be more helpful or beneficial. And if someone is taking an antibiotic, are they somewhat resistant to antibiotics?

Kiran Krishnan 28:35

The bacillus, right? They're resistant, not in the traditional sense where they have these antibiotic-resistant genes. They are resistant in that if the environment around them is not ideal for growth, like if there's an antibiotic around, they go in and stay in the spore form. They just lay dormant and they wait. They're not metabolically active. And then, when the levels come down, they come out and start functioning.

Dr. Jill 29:01

Is that like when you have a bottle that's on your shelf? Are they fairly dormant until they get into the human body? Is that correct?

Kiran Krishnan 29:07

One hundred percent. Yes. If you took the MegaSpore bottle, the dried powder in the capsule, you could let it sit on a shelf for probably 200 million years. It will still be exactly how it is until someone consumes it and it goes in and hits the small intestine. There's evidence of that. Where did I come up with that insane number? Some of the oldest bacteria I ever found were found in a deep cave in southern California in salt crystals.

Kiran Krishnan 29:41

Scientists, when looking for clues on how to work around antibiotic-resistant genes, have been looking for new bacteria that humans have never discovered before because bacteria have the capability of producing antibiotics. That's where most antibiotic products come from, after penicillin. They were in these caves. They were sampling things, trying to find new bacteria and then they got these salt crystals out of the cave. Then they melted the salt crystals out and they could plate out all these bacteria that were in there.

Kiran Krishnan 30:12

The only bacteria that were still living in there that they could plate out were these Bacillus spores and they were 250 million years old. They were just sitting there dormant for that long and they could still grow them on the plate. They were still alive. There was another example of it where there was a fossilized honey bee in amber, like in Jurassic Park. A little mosquito got fossilized in amber. This was a whole ancient honey bee. And this was in South America. They were able to drill in and pull the substance out of the honey bee's gut. They found in the honey bee's gut Bacillus probiotic bacteria that were about 50 million years old and still alive in that ancient honey bee's gut.

Kiran Krishnan 30:55

So these organisms have been here way before we have. They were here before the dinosaurs were here. In fact, they may be the origins of cellular life here on Earth

because there's a theory called panspermia that looks at: Where did the cellular components come from? Where did amino acids come from, the proteins? Where did nucleic acids come from?—and so on. And when you sample meteorites that come in from out of space, they have nucleic acids on them. There are proteins on them and so on. So a bunch of scientists did studies to see: Are there microbes that live on Earth today that could have traveled interstellar on a meteorite and make it on Earth? And sure enough, *Bacillus subtilis* was able to survive seven years of interstellar travel.

Dr. Jill 31:45

Wow, this is like science fiction, except it's real. So *Bacillus subtilis*, I love that. That's your new HU58. It's a 250 million-year-old product, but it's new here. But I want to talk a little bit about that because I recently posted some research you shared on antiviral activity. So do you want to mention just a little bit about the power of... You talked a little bit about its antimicrobial activity, specifically viral, and I was really impressed.

Kiran Krishnan 32:13

Yes. So the *Bacillus* has this amazing repertoire of capabilities in the human body. It's known for its antimicrobial capabilities [by] defending the body against pathogens. In fact, the NIH published a study about three years ago on 460 patients or so, where they sampled people who had MRSA colonization throughout their body with the really dangerous antibiotic-resistant staph. What they found was that in anyone in the big population that they looked at—and this was a Thailand population—who did not have MRSA, what they had instead was *Bacillus subtilis*. And if they did not have any *Bacillus subtilis*, they had MRSA growing. So that was the only organism they found in these individuals that was associated with not having MRSA. If you had adequate colonization in and on your body by *Bacillus subtilis*, you had no MRSA.

Kiran Krishnan 33:11

So they published a study and said [that] this could be a very important probiotic to combat some of these important drug-resistant bacteria. So now they can protect us against all kinds of drug-resistant bacteria. On top of that, they have a number of antiviral compounds. And they have antiviral compounds that have been shown to

fight against things like influenza—not COVID-19, but other coronaviruses they've tested. They've looked at a number of different respiratory viruses and so on.

Kiran Krishnan 33:46

They produce these leavens, and they produce these surfactants when they're in and on you that have direct antiviral activity so they're protecting the host the whole time. That's where that symbiogenesis relationship comes from, where there's this beautiful mingling of the two different kinds of organisms, which is us, the host, and then them. So for millions of years, we've said: Okay, we're going to eat you. We're going to give you a home. Our immune system doesn't attack you so we're letting you be. But you need to do some things for us in return.

Dr. Jill 34:21

Yes, mutual benefit.

Kiran Krishnan 34:23

Exactly. And then the spores went: Okay, we're going to clean up the house. We're going to do all the housekeeping work. We're not going to let any other bugs come in here. We're not going to let viruses or bacteria invade the host. We want the host [to be] healthy. Because the host becomes their home, that's how they know to increase the diversity in the host. That's how they know to find and fight against problematic organisms. They even defend this against things like viruses.

Kiran Krishnan 34:50

They help us detoxify things like poisons that are in our system. *Bacillus subtilis* has been shown to be able to break down organic-based pesticides like glyphosate and Roundup. Most recently, there was an article I just sent to my team showing that arsenic and other heavy metals can actually be sequestered by these organisms. Plastics can be broken down by these organisms. So they have a whole host of protective effects. Oh, another one, DON, which is a really powerful mycotoxin, and that has all kinds of autoimmune implications for people. It's a massive trigger. *Bacillus subtilis* has at least two studies showing that it protects against the effects that DON creates.

Dr. Jill 35:44

Yes, the sky is the limit. Again, in clinical practice—I'm a clinician and I see patients every day—that's where the rubber meets the road. You can talk research all you want. And I love that. But then I'm like, "Okay, is it going to work?" So from my clinical experience with MegaSpore's five strains, I love it. It's amazing. And what I've seen in people with SIBO and SIFO... For those of you who don't know, this is bacterial overgrowth in the small bowel. [There are] many, many causes. I won't go into that all today. And SIFO is fungal overgrowth. And it's very, very common now to have either both or at least one of the others. These patients often don't tolerate the old probiotics or the other types that are lactobacillus- or bifidobacteria-based. They don't do well. They do worse.

Dr. Jill [36:21](#)

That was me 20 years ago with Crohn's. I didn't do well with any of those and I didn't know why. Well, now I know why. But they almost always tolerate MegaSpore, [which] is my first go-to. But even if they don't tolerate that in the initial phases, I love the *Bacillus subtilis*, because even with my most sensitive patients, I don't think I have had one in my clinical experience that hasn't tolerated the HU58. It's currently what I'm on, if you want to know the secret. I love it. The other thing that's so interesting is that it really does help with SIBO and SIFO. Like I said, I often see mold patients, so I feel like they do a lot better.

Dr. Jill [36:56](#)

Now, one other thought: I have no clinical experience with this. And I'm going to step outside the box and ask you if you've seen anything. I have these patients with colonization up here with bacteria, fungus, and everything. And I'm wondering, have you seen any research or do you think it's possible to do some research on nasal rinse with *Bacillus subtilis*?—because it makes perfect sense to me that it would help with the MRSA and then in the sinuses.

Kiran Krishnan [37:20](#)

You're 100% correct. In fact, we're working with an ENT group in Canada right now where we are setting up a nasal rinse study using the *Bacillus*.

Dr. Jill [37:30](#)

Send me that when you get it published.

Kiran Krishnan 37:34

Absolutely. When talking to the ENT group, they said it's all strep and staph. That's what's out there. We know that Bacillus does a fantastic job of competing against strep and staph, not only competing against strep and staph as bacteria one to one but also enhancing the immune system's ability to recognize those organisms. Bacillus has this amazing immune-activation role. They can activate something called toll-like receptors. Toll-like receptors activate something called pattern recognition receptors. What that means in a simplistic form is that Bacillus will come and it'll find, let's say, a bacteria that's problematic and it'll tag that bacteria for the immune system to go: Hey, you've got to pay attention to this and learn what this bacteria looks like. That's a process called immune tutoring. In fact, we count on Bacillus to do that in the early stages of life because there are studies that show that babies who are exposed to Bacillus actually develop gut-associated lymphoid tissue much more profoundly than babies who aren't.

Dr. Jill 38:38

And [inaudible] for our listeners. That's dirt. So for babies and children who play in the dirt and carry it out of the garden, this is the training of the immune system. I have a friend who uses hand sanitizer. Well, of course, nowadays, hand sanitizer. This is before our pandemic. And her poor children were sick all the time because they had never touched dirt. I just want to clarify.

Kiran Krishnan 38:59

One hundred percent. It makes all the difference in babies and what happens to them long term. The risk for allergies, asthma, and all of these things increases and increases more. In fact, there's a finished allergy study that illustrated this for them. There was a big problem occurring in Finland where, like in the US, asthma and allergies were becoming an epidemic among kids. In the US, somewhere around 10 million kids suffered from pretty bad asthma. The same thing was happening in Finland.

Kiran Krishnan 39:31

However, about 100-something kilometers down the road was a town in Russia [with] almost the same geography and they had much lower allergy rates there. So then Finland said: Well, what the hell's going on? We need to do a big study to figure out: What are the differences? So they went through everything and some of the

big things they found that made a huge difference in the rates of allergies in the two areas were that in the Russian town, they kept the doors and windows open a lot more so they got a lot more of the outside air into the house. They did not sterilize their surfaces. They did not have [the notion] that clean is associated with that bleachy smell. They did the opposite in Finland, where there are a lot more doors and windows closed. More air conditioning, more sterilized surfaces. And that in itself made a huge difference.

Kiran Krishnan 40:19

And then, because you can do this in these progressive places, Finland said: Okay, this data is clear enough where daycares need to have dirt pads. So they started building daycares with gardens and just dirt pads and made it mandatory for kids to play in the dirt throughout the day for X number of hours. And they started comparing those kids to kids who went through the normal daycare setting. They started to see a massive change in allergy and asthma rates. It's just that simple.

Kiran Krishnan 40:54

Again, it's just coming back to the basics. That's how we looked at probiotic development. I told you I went back to my evolutionary biologist-closeted days and said, "What is a simple way that we get exposed to organisms and where can we find these organisms?" So it's really mind-boggling when you think about how simple some of this stuff can be, but we've very much complicated it.

Dr. Jill 41:18

Oh, yes. [inaudible] because of that. There have been products on the market [that are] soil-based and there have been a few concerns about safety. Tell us [more about that] for the people asking that question because your strains are researched. But tell us the difference between just regular soil-based with tons of things we don't really know. And if there could be... because I have seen some of that too, where there could be an issue because it's contaminated.

Kiran Krishnan 41:44

Totally. And it's very hard to mimic natural soil, right? You really can't, because the question also becomes: What soil are you moving? The soil over here in your front yard is completely different than the soil in the woods when you go for a walk. And what layer of the soil? What level of the soil? All of that. So the simplistic approach

of "let's just grab a bunch of bacteria in the soil and then use that as a probiotic" just doesn't work because we don't know what those microbes are. We don't know what happens when you dose it like a supplement versus just getting transient exposure to it in the soil.

Kiran Krishnan 42:25

So that's the problem: We've seen soil-based organism products that don't have a well-characterized list of bacteria. And there are some in there that'll produce toxins. And there are some in there that can be dangerous. So you want to be careful [when] ingesting those. Now, nature, if you're using nature's soil and you're going out for a walk in the woods, that area has been primed by millions of years of evolution with the ecosystem around it. So it's a different thing than trying to imitate that in a cap.

Dr. Jill 42:59

And it's concentrated and capsulized.

Kiran Krishnan 43:01

Exactly. The analogy I give [is that] it's like baby formula. Since the mid-1800s, companies have been spending hundreds of millions up to billions of dollars trying to mimic mother's milk. And they've never been able to, right? Even today, after billions of dollars and hundreds of years of research, the biggest companies in the world, the Johnson & Johnsons and all that, cannot imitate mother's milk. Mother's milk is mammalian food that's perfected by evolution. It's incredibly complex. It has over 200 different prebiotics in it. It has upwards of 600 different microorganisms in it. It's so complex that there's no way we can try to imitate that. That's why if the baby doesn't nurse and does bottles instead for most of the first year, you see a big difference in the health of the baby. In the same way, we cannot imitate the soil. What we did instead was try to hone in on at least one component of the soil that would have a direct probiotic effect and then look and see: Is that going to really move the needle for us?

Dr. Jill 44:14

Amazing. So in the last few minutes, what are some of the cutting-edge new things that are coming out? Tell us about either new products or new research. What's the latest that would be interesting to know?

Kiran Krishnan 44:26

Yes. One of the areas that we're really big on, which is quite relevant right now, is the whole area of mood and sleep, stress management, and improving theta waves in the brain. How can we do that? How can we put people in a better state of mind to deal with stress? Obviously, we can't do anything as a company to remove stress for people. Stress is a normal part of life. But the question is, can we deal with it better? Can we put them in a state that helps them deal with it better? Can we put them in a state where the stress is not so detrimental to their health? And then, can we also put them in a state that allows them to sleep better in the evening so they can recover from the day's worth of stresses and all of that? That's a big component and that's a gut-brain connection issue.

Kiran Krishnan 45:16

Now, we have been focusing on the spores with LPS. Lipopolysaccharide and endotoxemia—that type of leaky gut—is a big driver of mismanagement of stress because LPS interferes with serotonin and dopamine binding and increases inflammation in the dorsal vagal complex. It screws up the communication between the gut and the brain. It's a big, menacing issue in dealing with stress and mood, leading to things like anxiety and depression and disrupting sleep as well. So we said, "Okay, we've got that part covered."

Kiran Krishnan 45:48

But there's another component. There's another component that's called elevated basal inflammation, which is stress-induced inflammation. This is stress. This is inflammation that comes about from short bouts of stress throughout the day. That is, you're driving a car and somebody cuts you off and you're like, 'Ah!' You honk the horn. You throw the finger at each other. You get that elevated stress. That single bout of stress will actually make a measurable change in your microbiome for a short period of time. That single measurable change will actually lead to the activation of macrophages, the release of NF-kappaB, the activation of the HPA axis, the release of cortisol, and the activation of the sympathetic system. This whole cascade occurs. And every time that occurs, it primes the body for more stress response.

Kiran Krishnan 46:43

So we were thinking, "Okay, is there a microbiome solution to reducing that impact and reducing that release of cortisol when you encounter a stressful situation?" And sure enough, there is. We got to work with a fascinating strain. It's called *Bifidobacterium longum* 1714. What's unique about this *Bifidobacterium* that you don't find on any other *Bifidobacterium longum*s is that it has an outer layer called an exopolysaccharide. And again, there's a theme here, right? So we love the spores because of their weird little spore coat, but this *Bifidobacterium* is unique because it has this coating on it called an exopolysaccharide. And as it turns out, that exopolysaccharide component has the ability to dramatically reduce basal stress-induced inflammation.

Kiran Krishnan 47:33

There are a number of published studies from the most renowned gut-brained research institute, which is in Cork, Ireland. They've got a number of studies showing that when you take this species, you dramatically reduce cortisol release and increase theta waves in the brain. You actually improve sleep. So you shorten the time to sleep, you increase the duration of sleep, and you improve the quality of sleep. It dramatically improves the ability to deal with stressful situations.

Dr. Jill 48:07

It's interesting because, as practitioners, we're thinking of phosphatidylserine, magnolia, and all these things. And now you're saying no—actually, probiotics might be our next game changer for reducing cortisol. That's so exciting.

Kiran Krishnan 48:19

Totally.

Dr. Jill 48:20

Is this not on the market yet?

Kiran Krishnan 48:24

It will be. We're going to have it on the market by the end of May. So we've been chugging forward really hard on this because we're like: "People need this. People really, really need this."

Dr. Jill 48:36

Especially now.

Kiran Krishnan 48:37

Especially now. We've all gone through this highly stressful one and a half years or more. And hopefully, things are getting back to normal—more normal. But the world is a stressful place to begin with. And what the studies show is that those short bouts of stress activate macrophages. Those activated macrophages create this long-term inflammatory response in the brain that keeps triggering the HPA axis. So we keep releasing these glucocorticoids and keep forming cortisol. That's why for people, it becomes harder and harder to deal with stress. So remember when you were younger? You could deal with stress a little bit better. Then, as you get older and as time progresses, things stress you up much easier and it becomes harder.

Dr. Jill 49:27

Our stress resilience goes down. Yes, exactly.

Kiran Krishnan 49:29

Totally, 100%. That's because our system keeps rotating and keeps priming towards the glucocorticoid cortisol release mechanism. And the studies show that we can actually bring it back.

Dr. Jill 49:42

I always say it's like ruts in the old wagon wheel. Ruts that are [inaudible]. Then our wheels just go into the rut and we do the same path over and over and over and over again until something changes. So potentially, May. Well, we'll stay tuned. And you guys, if you're listening here, I'll be sure to share. Do you have a name for it yet?

Kiran Krishnan 50:00

Yes. We have two. So there are two versions of the product. There's ZenBiome Cope and ZenBiome Sleep, right? The sleep one is formulated with things that help you sleep as well, not melatonin but other herbals. And then Cope is the daytime stress management product.

Dr. Jill 50:21

It's so exciting! I can't wait for it.

Kiran Krishnan 50:23

It's profound. It's profound, right? And then you combine it with the spores, where you're already dealing with the LPS, and between the two, it's an amazing one-two punch.

Dr. Jill 50:33

So you could give them to patients. They could take them both with no problem?

Kiran Krishnan 50:36

Absolutely, yes. You should take them both. We really want to improve people's states of mind because that is, to us, a critically important role of a company like ours. And we want to give them that at the foundational level. There are lots of people who can train you on how to deal with stress and all that. You probably give your patients lots and lots of tools on how to manage and mitigate it and all that. What we want to do is do it at the foundational level, where the stress gets turned on, and start turning that switch back the other way. So that one is super exciting for us.

Dr. Jill 51:10

I love that. And nowadays, we need all those. We need the mind-body [piece], the meditation, the walking in nature, and then also the probiotic. This is so exciting. We didn't even get to bovine immunoglobulins and all that sort of amazing stuff. If you're listening here or on any platform, we'll link up to all the great products. I've been a huge fan of bovine immunoglobulins. Do you want to say a bit about that and about the power of [it] and what is that? You've got Mega IgG MegaMucosa. Tell us just a little bit about bovine immunoglobulins.

Kiran Krishnan 51:40

Yes, I love those. It's an amazing array of IgG antibodies that you get to have. What's been happening is that the cows' immune systems have been working very hard to produce an array of IgG antibodies against all kinds of stuff that they encounter in the outside world—against mold toxins, environmental toxins, viruses, and bacteria—all of these things that trigger a toxicogenic and inflammatory response in us. So then, if we get the serum from the cows and then spin out and purify the immunoglobulins, we've got a bunch of these amazing antibodies that we can now

take. What they do is they'll go in and coat the gut and then they start binding and neutralizing all of these things in the gut.

Dr. Jill 52:28

And there are studies with H. pylori and viruses—other viruses, you name it. I don't know what all... I mean, I've seen for sure, H. pylori and other bacteria and viruses. But they really have power to neutralize these don't they?

Kiran Krishnan 52:41

They do. They neutralize it and take it out of the system through defecation so those things don't trigger inflammatory responses in your system. What really excited me about this particular product and the way we even met the company that we partnered with for it is that they were involved in a number of HIV studies. The NIH published a paper back in 2014 showing that the biggest driver of mortality in HIV was leaky gut. They called it HIV enteropathy. So that's increased permeability in the gut lining. They show that you can measure mortality risk better with how permeable their intestines are versus how much virus they have, which is mind-boggling that the NIH published this study.

Kiran Krishnan 53:26

So they put out a challenge for HIV researchers, saying you need to find solutions to deal with this massive permeability issue that occurs in this disease. So this company jumped in and they did two or three well-done studies with one of the top HIV researchers here out in the Midwest, Dave [inaudible], I think is his name. What they showed is that even under very stressful compromised conditions like HIV that have really bad leaky guts, this immunoglobulin was able to neutralize and bring down inflammatory responses and help those guts actually heal—the lining of the guts, reestablish the lining of the guts.

Kiran Krishnan 54:07

So under that kind of condition, if it can help, under the kind of condition that most of us are facing from just the toxins and everything we're exposed to, it really does a profound job. It's one of my products that I never forget to take. There are really two or three things that I'm always on. The other things I keep forgetting and need to take it back. But with the immunoglobulins, the MegaSpore or the HU58, I switch between the two, and then the K2. I take the K2 all the time. I agree with you.

Dr. Jill 54:36

I agree with you. The Myomax, the HU58, and the IgG are my three. I totally agree with you.

Kiran Krishnan 54:44

When Zenbiome comes out, I'm going to be on that all the time for sure.

Dr. Jill 54:48

Oh, Kiran, I was excited about this, but this is even... I'm so excited about your new product and I am just so grateful. I know our listeners have so many comments and questions. People are really excited to hear this so when we get your new product out, if you're listening here, you'll find it. Wherever you find me, you'll hear about it. Thank you so much for your time. Thank you for your dedication and all your work in this industry. You've really moved the needle in the probiotic industry, and that's exciting to think about. That's really not that many years to have made the change and made the impact that you have. And for someone like me in clinical practice, you've created a tool for me to help many more people. So thank you. Thank you from the bottom of my heart for all the work you've done. And thank you for taking the time to talk to me today.

Kiran Krishnan 55:30

It was an absolute pleasure. Thank you so much for all your continued support. We look forward to doing more things together. I'm super excited for you guys and for you and your patients to try the new products coming out. And I'm happy to come back anytime you want.

Dr. Jill 55:46

The website is? We'll be sure to link that but you can actually say it for those who are listening.

Kiran Krishnan 55:51

Yes, MicrobiomeLabs.com. If people want to come, there are a lot of resources on there as well. We sell our products only through healthcare practitioners like Dr. Jill. So you can gain access to the products through your healthcare practitioner.

But you can come to our website. There are lots of resources on there to learn about the microbiome.

Dr. Jill 56:10

Yes. This website is amazing. So if you want more information, [visit] MicrobiomeLabs.com. And I will put linked products. You can get those at DrJillHealth.com. There's MegaSpore, HU58, Mega IgG, Mega Prebiotic, and Mega Mucosa. The other one we didn't talk about, but I'll leave with this one, the MegaOmega. I love this—the anti-inflammatory fish oil. So check that out, MegaOmega. Kiran, thank you again. What a pleasure it's been!

Kiran Krishnan 56:40

Thank you so much.