The Gut Rules It All: Microbiome, Immunity & Inflammation with Kiran Krishnan Transcript

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Introduction and Guest Background

Welcome back to the Detox Docks Report Welcome back to the Detox Docks Report where we talk gut mold and toxins. My where we talk gut mold and toxins. My guest today is Kieran Christian, a guest today is Kieran Christian, a research microbiologist who spent over research microbiologist who spent over 20 years studying the microbiome and 20 years studying the microbiome and making this science make sense. He making this science make sense. He co-founded Microbiome Labs. He's run co-founded Microbiome Labs. He's run more than 60 human clinical trials and more than 60 human clinical trials and he's one of the people genuinely moving he's one of the people genuinely moving this field forward. Kieran, I've been this field forward. Kieran, I've been looking forward to this. Thanks for looking forward to this. Thanks for being here.

being here. >> It's my pleasure. Thank you for having >> It's my pleasure. Thank you for having me. me. me. So, I'd love to start with your story. So, I'd love to start with your story.

What pulled you into microbiome research What pulled you into microbiome research in the first place? in the first place? >> Yeah. You know, um I I think it's a a >> Yeah. You know, um I I think it's a a mix of genetics and uh and movies. Um mix of genetics and uh and movies. Um so, um my if you if you look at my so, um my if you if you look at my parents, um so my my dad was a micro parents, um so my my dad was a micro electronics engineer. So, he was ahead electronics engineer. So, he was ahead in his field. He had almost 400 US in his field. He had almost 400 US patents in his name. Um so, he he was a patents in his name. Um so, he he was a very systems thinking kind of guy. um very systems thinking kind of guy. um inventing things and you know all that.

inventing things and you know all that. So he was he was in that field and and So he was he was in that field and and then my mom's a a medical doctor and then my mom's a a medical doctor and she's uh a clinician with the soft she's uh a clinician with the soft sciences and and has a very kind of sciences and and has a very kind of empathetic view in in science and empathetic view in in science and medicine. Uh, and I think I got like a medicine. Uh, and I think I got like a little bit of both of them, you know, little bit of both of them, you know, and and I've got the love and passion and and I've got the love and passion for the biological sciences and the the for the biological sciences and the the empathetic uh, perspective on that on empathetic uh, perspective on that on helping people through science. Uh, but helping people through science. Uh, but then thinking about the science like a then thinking about the science like a systems engineer um, and always looking systems engineer um, and always looking for the nuance and the innovation in in for the nuance and the innovation in in all of this. Um, so I think generally all of this. Um, so I think generally that that's how my my my brain is that that's how my my my brain is structured. But then the question is structured. But then the question is like where do you go with that right? So like where do you go with that right? So if I became a conventional doctor like I if I became a conventional doctor like I was thinking about doing I wouldn't was thinking about doing I wouldn't necessarily get to exercise the necessarily get to exercise the engineering part of it or if I went into engineering part of it or if I went into physics and engineering I wouldn't have physics and engineering I wouldn't have the biological empathy part of it um as the biological empathy part of it um as much. It would you could certainly find much. It would you could certainly find outlets for those um but it wouldn't be outlets for those um but it wouldn't be as straightforward. Um and then the as straightforward. Um and then the other part of me that's that is um a big other part of me that's that is um a big driver is I' I've got a very deep driver is I' I've got a very deep curiosity for frontiers. Um and so I was curiosity for frontiers. Um and so I was always very interested in the world of always very interested in the world of quantum mechanics and you know if I was quantum mechanics and you know if I was better at math I would probably have better at math I would probably have gone in that route but I'm not I'm not gone in that route but I'm not I'm not good enough at math to to have gone that good enough at math to to have gone that route. And so um I was watching a movie route. And so um I was watching a movie my freshman year of college. Uh, I knew my freshman year of college. Uh, I knew I was going to go into the sciences and I was going to go into the sciences and I was premed already, you know, by by by I was premed already, you know, by by by determination. Um, and I was trying

to determination. Um, and I was trying to figure out like what did I want to do figure out like what did I want to do from a from a major perspective. Um, from a from a major perspective. Um, everyone kind of goes biology or everyone kind of goes biology or chemistry or something like that. And chemistry or something like that. And then that movie Outbreak, if you then that movie Outbreak, if you remember that, um, was it with Morgan remember that, um, was it with Morgan Freeman and Dustin Hoffman, right? It Freeman and Dustin Hoffman, right?

How Kieran Got Into Microbiology

It was like a it was like a Ebolaike was like a it was like a Ebolaike outbreak in a town, small town in the outbreak in a town, small town in the US. Um, and then it was like these all US. Um, and then it was like these all these CDC scientists who were these CDC scientists who were veriologists and all that kind of veriologists and all that kind of chasing down this this bug and trying to chasing down this this bug and trying to figure out what a cure for it and all figure out what a cure for it and all that. And I was like, that is exciting.

that. And I was like, that is exciting. That's what I want to do, you know? I That's what I want to do, you know? I want to I want to figure out pathogens want to I want to figure out pathogens and chase them down and figure out cures and chase them down and figure out cures for them and all that. So that's what for them and all that. So that's what got me into the world of microbiology.

got me into the world of microbiology. Um, so I I studied started studying Um, so I I studied started studying microbiology and I stayed with that part microbiology and I stayed with that part of my education. Um and then what got me of my education. Um and then what got me into the microbiome side of it is that into the microbiome side of it is that frontier thinking. Um you know because frontier thinking. Um you know because that was the kind of unknown untapped that was the kind of unknown untapped area in microbiology. Um in fact there area in microbiology. Um in fact there was there was actually one kind of key was there was actually one kind of key moment that got me much more interested moment that got me much more interested in the microbiome than any other aspect in the microbiome than any other aspect of microbiology. It was I was number of of microbiology. It was I was number of years ago, this is almost like 20 years years ago, this is almost like 20 years ago, I was asked to uh contribute to an ago, I was asked to uh contribute to an article for US News and World Report on article for US News and World Report on the hygiene hypothesis, right? Um and the hygiene hypothesis, right? Um and and one of the questions that was asked and one of the questions that was asked of me was, you know, like how many real of me was, you know, like how many real pathogens do we have that we have to be pathogens do we have that we have to be really concerned about, you know, on a really concerned about, you know, on a day-to-day basis? And I was like, I day-to-day basis? And I was like, I don't know, that's a great question. Let don't know, that's a great question. Let me actually dig into it a little bit.

me actually dig into it a little bit. And so I started digging into it to And so I started digging into it to understand like of all the microbes understand like of all the microbes we've discovered, viruses, bacteria, we've discovered, viruses, bacteria, fungi, all that stuff, like what fungi, all that stuff, like what percentage of them are, you know, direct percentage of them are, you know, direct or absolute pathogens, right? That that or absolute pathogens, right? That that you come in contact with them, they're you come in contact with them, they're going to make you sick and you're you're going to make you sick and you're you're you're in trouble. And and what I found you're in trouble. And and what I found was that it's like 1%.

was that it's like 1%. Right? Which means that 99.9% Right? Which means that 99.9% of all microbes we encounter are either of all microbes we encounter are either benign or beneficial. But even in the benign or beneficial. But even in the world of microbiology there's so much world of microbiology there's so much focus on that.1%.

focus on that.1%. You know all the research work I did in You know all the research work I did in my microbiology training was on my microbiology training was on pathogens and that's the track you go pathogens and that's the track you go right normally and uh especially we go right normally and uh especially we go clinical microbiology you're focusing on clinical microbiology you're focusing on those pathogens. So then of course my those pathogens. So then of course my mind goes what about the 99.9%.

mind goes what about the 99.9%. Like Like Like >> isn't that the best way to control >> isn't that the best way to control the.1% letting them flourish right? And the.1% letting them flourish right? And so then shortly after that, this whole so then shortly after that, this whole human microbiome project kicked off and human microbiome project kicked off and I was like, that's where they're I was like, that's where they're studying the 99.9%. Right? That's where studying the 99.9%. Right?

Why the Microbiome Matters for Immunity

That's where I want to focus my time. So very long uh I want to focus my time. So very long uh probably the longest answer to that probably the longest answer to that question you've ever had, but uh question you've ever had, but uh hopefully that provides context.

hopefully that provides context. >> I love that. It's so true. It's not just >> I love that. It's so true. It's not just about that.1%. about that.1%.

It's about the other 99.9% It's about the other 99.9% and the terrain, right? And how they're and the terrain, right? And how they're all interacting. So in my world, mold all interacting. So in my world, mold and biotoxins, environmental illness, we and biotoxins, environmental illness, we constantly talk about immune constantly talk about immune dysregulation, but what I always come dysregulation, but what I always come back to with my patients is that the gut back to with my patients is that the gut rules it all. So Karen, can you help me rules it all. So Karen, can you help me make that case? Why is the microbiome so make that case? Why is the microbiome so central to immune regulation in the central to immune regulation in the first place? Yeah, you know, um the best first place? Yeah, you know, um the best analogy I always give is uh think of the analogy I always give is uh think of the immune system as a army that's born with immune system as a army that's born with all of the tools. You know, they have all of the tools. You know, they have all the guns and bombs and tanks and all the guns and bombs and tanks and everything that they need to fight a everything that they need to fight a war, but they have no general. They have war, but they have no general. They have no information, right? They don't know no information, right? They don't know who the enemy is effectively, right? And who the enemy is effectively, right? And they cannot know that which which makes they cannot know that which which makes sense because most of the innate sense because most of the innate knowledge in our cells are coded in our knowledge in our cells are coded in our DNA. But you cannot code the environment DNA. But you cannot code the environment in your DNA cuz the environment changes, in your DNA cuz the environment changes, right? So you're you're all the way out right? So you're you're all the way out in Virginia, Virginia Beach, and I'm in in Virginia, Virginia Beach, and I'm in Chicago. We have different things that Chicago. We have different things that our immune systems have to battle. And our immune systems have to battle. And so if my immune system was born with a so if my immune system was born with a certain limited code as to what the certain limited code as to what the enemy is and who it is and how you go enemy is and who it is and how you go after it, I would be in huge trouble if after it, I would be in huge trouble if I just went to the next state, right?

I just went to the next state, right? And so the immune system is one of the And so the immune system is one of the only systems in your body that has to only systems in your body that has to adapt to your environment, right? And as adapt to your environment, right? And as a result of that, the immune cells are a result of that, the immune cells are born naive. They have to learn about born naive. They have to learn about your environment wherever you go. and your environment wherever you go. and they have to do it relatively quickly they have to do it relatively quickly because if I go on vacation to Asia next because if I go on vacation to Asia next week, you know, my immune system has to week, you know, my immune system has to adapt to that area, right? And so then adapt to that area, right? And so then the question becomes, well, how do they the question becomes, well, how do they learn, right? How do they learn what to learn, right? How do they learn what to attack, what not to attack, what what attack, what not to attack, what what level of seriousness to pay attention to level of seriousness to pay attention to different things because there's no different things because there's no forwardfacing component of the immune forwardfacing component of the immune system, right? We don't have immune system, right? We don't have immune sensing cells on our epidermis to like sensing cells on our epidermis to like sense everything that's going on in the sense everything that's going on in the air. They use the microbiome as a way of air. They use the microbiome as a way of translating environmental information.

translating environmental information. So the relationship I explained between So the relationship I explained between the immune cell, the immune system and the immune cell, the immune system and the microbiome is that the microbiome the microbiome is that the microbiome are the eyes and ears of the immune are the eyes and ears of the immune system. Um they train, they're the system. Um they train, they're the neighborhood watch, if you will, for the neighborhood watch, if you will, for the immune system, right? Um a a great immune system, right? Um a a great analogy is if if you think about um the analogy is if if you think about um the role of the immune system, it's a very role of the immune system, it's a very very difficult role. If I were to be a very difficult role. If I were to be a cell in a body, I wouldn't want to be an cell in a body, I wouldn't want to be an immune cell, right? It's it's a massive immune cell, right? It's it's a massive job. Um so if you think about one of job. Um so if you think about one of your like so sentinel immune cells that your like so sentinel immune cells that are circulating around so take a are circulating around so take a macroofase or dendritic cell that has to macroofase or dendritic cell that has to circulate around and find dangers, circulate around and find dangers, right? A lot of the dangers they right? A lot of the dangers they encounter are going to be microbial encounter are going to be microbial dangers that things that they have to dangers that things that they have to deal with or or or toxins uh and deal with or or or toxins uh and neutralize them or microbial byproducts neutralize them or microbial byproducts like in the case of mold toxins, right?

like in the case of mold toxins, right? So they have to identify all of these So they have to identify all of these things, but they're doing that in a sea things, but they're doing that in a sea of trillions of other microbes and all of trillions of other microbes and all of their byproducts that they kick out, of their byproducts that they kick out, right? So, so the analogy there to right? So, so the analogy there to really put it in perspective for people really put it in perspective for people to understand what the immune system has to understand what the immune system has to do and why they cannot do it without to do and why they cannot do it without the microbiome is imagine there's a the microbiome is imagine there's a stadium and there's a big concert in a stadium and there's a big concert in a stadium, right? So, there's 200,000 stadium, right? So, there's 200,000 people in this stadium. Uh, and it's a people in this stadium. Uh, and it's a it's a massive say it's Taylor Swift it's a massive say it's Taylor Swift because she's the only one that can fill because she's the only one that can fill a stadium with 200,000 people. Um, so a stadium with 200,000 people. Um, so let's say there's a concert 200,000 let's say there's a concert 200,000 people. you know that there's some people. you know that there's some intelligence out there that out of that intelligence out there that out of that 200,000 there are five people that are 200,000 there are five people that are intending on causing trouble and causing intending on causing trouble and causing harm, right? So 195 199,9 harm, right? So 195 199,9 you know [clears throat] 95 are okay, you know [clears throat] 95 are okay, but you've got five people now. They but you've got five people now. They look very similar to everyone else. They look very similar to everyone else. They all address relatively similar and and all address relatively similar and and they're all humans and you are the lone they're all humans and you are the lone security guard. How do you find those security guard. How do you find those five people? Right. and and the these five people? Right. and and the these numbers are very specific. And the numbers are very specific. And the reason those numbers are specific is reason those numbers are specific is because it's a 200,000 to1 ratio of because it's a 200,000 to1 ratio of circulating immune cells to microbes in circulating immune cells to microbes in your mucosa and in the body, right? So your mucosa and in the body, right? So for every one immune cell that's trying for every one immune cell that's trying to protect you from microbes and to protect you from microbes and microbial byproducts and all of that microbial byproducts and all of that stuff, you've got 200,000 microbes, stuff, you've got 200,000 microbes, right? So, the only way you as the lone right? So, the only way you as the lone security guard in that stadium can find security guard in that stadium can find the five potential uh people that are the five potential uh people that are trying to cause harm is if the other uh trying to cause harm is if the other uh 99.5% 99.5% 99.5% of the people are on your side and are of the people are on your side and are radioed into you. And if they see radioed into you. And if they see anything suspicious, they call you and anything suspicious, they call you and tell you exactly where it is. Right?

tell you exactly where it is. Right? That's the only way is if everyone else That's the only way is if everyone else is on your side and working and diligent is on your side and working and diligent and looking out for something abnormal.

and looking out for something abnormal. So that's exactly what's happening with So that's exactly what's happening with your commensal organisms and the immune your commensal organisms and the immune system. The commensal organisms are system. The commensal organisms are everywhere all the time, right? They see

everywhere all the time, right? They see everything coming in. They have a everything coming in. They have a certain degree of innate knowledge of certain degree of innate knowledge of what's normal and what's not normal in what's normal and what's not normal in that environment because microbes adapt that environment because microbes adapt much faster than our own cells do.

much faster than our own cells do. Right? Their genetic changes occur much Right? Their genetic changes occur much faster than our genetic changes. And as faster than our genetic changes. And as a result of that, they have become the a result of that, they have become the neighborhood watch where they can alert neighborhood watch where they can alert the immune system to anything that looks the immune system to anything that looks unusual, unusual, unusual, right? And and a and a perfect example right? And and a and a perfect example of that is in CO, right? We all knew we of that is in CO, right? We all knew we started seeing the statistics that started seeing the statistics that certain people had way higher risk of of certain people had way higher risk of of uh um you know really bad infection or uh um you know really bad infection or even mortality with COVID. Right? So if even mortality with COVID. Right? So if you took for example a 40year-old with you took for example a 40year-old with diabetic with diabetes and a 40-year-old diabetic with diabetes and a 40-year-old without diabetes, the 40-year-old with with diabetes, the 40-year-old with diabetes had 10 times higher risk of diabetes had 10 times higher risk of mortality and morbidity with COVID mortality and morbidity with COVID versus the 40-year-old without it.

versus the 40-year-old without it. Right? And it wasn't their blood sugar Right? And it wasn't their blood sugar issue or blood sugar management. It issue or blood sugar management. It actually, as it turns out, was a changes actually, as it turns out, was a changes in that 40-year-old with diabetes's in that 40-year-old with diabetes's microbiome. H and this was beautifully microbiome. H and this was beautifully mapped out by um a researcher at mapped out by um a researcher at University College Cork called Liam University College Cork called Liam Mahoney. Um what what he did was he was Mahoney. Um what what he did was he was able to take hundreds and hundreds of able to take hundreds and hundreds of thousands of cases of COVID and then map thousands of cases of COVID and then map the microbiomes and associated the the microbiomes and associated the microbiome mapping to the outcome that microbiome mapping to the outcome that the individual had. And then as a result the individual had. And then as a result of that accuracy, they were then also of that accuracy, they were then also able to get blind samples of the able to get blind samples of the microbiome of individuals that were microbiome of individuals that were exposed to COVID and could predict with exposed to COVID and could predict with a 98% certainty whether that individual a 98% certainty whether that individual got hospitalized or even died from COVID got hospitalized or even died from COVID just from looking at their microbiome.

just from looking at their microbiome. Right? Right? Right? >> Wow. >> Wow. >> Wow. >> They were able to see the pathobbiome. >> They were able to see the pathobbiome.

So when someone's gut microbiome is So when someone's gut microbiome is dysfunctional, it becomes very easy to dysfunctional, it becomes very easy to see how their immune system loses that see how their immune system loses that communication, right? You you don't have communication, right? You you don't have all of those people in that stadium all of those people in that stadium talking to you. So if a little virus talking to you. So if a little virus shows up way over here and your immune shows up way over here and your immune cells aren't paying attention to it, it cells aren't paying attention to it, it has a much higher chance of has a much higher chance of proliferating, infecting, causing more proliferating, infecting, causing more damage before the immune system ever damage before the immune system ever notices it, right? because the notices it, right? because the commensiles around it aren't signaling commensiles around it aren't signaling to the immune system that hey there's to the immune system that hey there's something happening here. We need you to something happening here. We need you to come here and pay attention to it.

come here and pay attention to it. Right. Right. Right. >> Right. >> Right. >> Right. >> So that's just one layer. What I just >> So that's just one layer. What I just talked about is just one layer of why talked about is just one layer of why the microbiome is so important for the the microbiome is so important for the immune system and your immune system immune system and your immune system would cease to function without the would cease to function without the microbiome. And studies have been done microbiome. And studies have been done on this where they take no biotic mice.

on this where they take no biotic mice. These are mice that have are are raised These are mice that have are are raised without a microbiome. without a microbiome.

um and and they have all of their immune um and and they have all of their immune components, right? They have their T- components, right? They have their T- cells and B cells and macrofasages and cells and B cells and macrofasages and dendritic cells. They have everything, dendritic cells.

Gut Health, Anxiety, and Endotoxemia

They have everything, but their immune and then they inject but their immune and then they inject these mice with a virus and their immune these mice with a virus and their immune system literally just sits there and system literally just sits there and watches, right? It does nothing. It watches, right? It does nothing. It doesn't it doesn't address the virus at doesn't it doesn't address the virus at all. The virus just infects and kills all. The virus just infects and kills the mouse the mouse >> micro. Yeah.

>> micro. Yeah. >> Yes. Yes. So, I think that's really >> Yes. Yes. So, I think that's really going to hit home for many many people going to hit home for many many people in my community who has who have in my community who has who have disregulated immune systems by biotoxin disregulated immune systems by biotoxin loads for sure. And how the microbiome loads for sure. And how the microbiome is really training that tolerance versus is really training that tolerance versus the reactivity. And the other piece the reactivity. And the other piece that's really huge for people is the gut that's really huge for people is the gut brain axis and how the stress and the brain axis and how the stress and the fight or flight that kind of goes with fight or flight that kind of goes with the mold and environmental toxin the mold and environmental toxin exposure and just the whole experience exposure and just the whole experience of that and how the gut modulating and of that and how the gut modulating and sort of biohacking the gut can actually sort of biohacking the gut can actually help with that as well. Can you speak to help with that as well. Can you speak to that too?

that too? >> Yeah, it's it's actually one of the most >> Yeah, it's it's actually one of the most powerful tools you can have against uh powerful tools you can have against uh anxiety, depression, and cognitive anxiety, depression, and cognitive dysfunction. Right. So um there was a dysfunction. Right. So um there was a study called the Netherlands study on uh study called the Netherlands study on uh the Netherlands study on anxiety and the Netherlands study on anxiety and depression. um with the continuous and depression. um with the continuous and and significant increase in prevalence and significant increase in prevalence of anxiety and depression in in the of anxiety and depression in in the first world countries um you know some first world countries um you know some countries with nationalized health care countries with nationalized health care systems they go let's do a countrywide systems they go let's do a countrywide investigation of what in the world is investigation of what in the world is happening so that we can understand this happening so that we can understand this problem right because of course they're problem right because of course they're spending a lot of their GDP on on spending a lot of their GDP on on managing these issues and so the the managing these issues and so the the country of Netherlands saw this as a big country of Netherlands saw this as a big problem so they initiated a 9-year long problem so they initiated a 9-year long study study study to to um identify people with anxiety, to to um identify people with anxiety, depression, and then and then they depression, and then and then they followed them for 9 years. They did many followed them for 9 years. They did many different interventions and all that.

different interventions and all that. They didn't control the interventions, They didn't control the interventions, but then they also looked at all of but then they also looked at all of these biomarkers. Uh and they were these biomarkers. Uh and they were looking for the biomarkers that were the looking for the biomarkers that were the most predictive of having uh anxiety and most predictive of having uh anxiety and depression, severity of anxiety and depression, severity of anxiety and depression, and onset of anxiety and depression, and onset of anxiety and depression. So, they looked at all kinds depression. So, they looked at all kinds of stuff, right? all these inflammatory of stuff, right? all these inflammatory markers and all kinds of metabolic markers and all kinds of metabolic markers and so on. The one marker that markers and so on. The one marker that they found to be the most predictive of they found to be the most predictive of the presence of anxiety and depression the presence of anxiety and depression was something called LPS, was something called LPS, lipopolysaccharide.

lipopolysaccharide. lipopolysaccharide. Right? Lipopolyaccharide is a component Right? Lipopolyaccharide is a component of a gram negative bacteria and about of a gram negative bacteria and about say half your bacteria in your say half your bacteria in your microbiome are gram negative. So you've microbiome are gram negative. So you've got about half the bacteria in your gut got about half the bacteria in your gut making this and this LPS compound. Uh so making this and this LPS compound. Uh so it's generated in your gut all the time it's generated in your gut all the time and in your lining of your gut it's and in your lining of your gut it's perfectly fine but if it leaks through perfectly fine but if it leaks through and ends up in circulation it becomes a and ends up in circulation it becomes a big problem. So, it's a great marker for big problem. So, it's a great marker for leaky gut, right? So, what the what the leaky gut, right? So, what the what the researchers showed over this 9-year researchers showed over this 9-year study was that um as long as people had study was that um as long as people had elevated levels of this LPS in elevated levels of this LPS in circulation, meaning it's leaking circulation, meaning it's leaking through um then they had anxiety and through um then they had anxiety and depression, right? And if they did depression, right? And if they did something right, they didn't control the something right, they didn't control the interventions, but over that 9-year interventions, but over that 9-year period, those individuals that saw a period, those individuals that saw a decrease in that LPS, their anxiety and decrease in that LPS, their anxiety and depression went away. For those indivi depression went away. For those indivi individuals that saw an increase in the individuals that saw an increase in the LPS, their anxiety and depression got LPS, their anxiety and depression got more severe. For those individuals that more severe. For those individuals that were kind of baseline that didn't have were kind of baseline that didn't have too much anxiety and depression, if too much anxiety and depression, if their LPS went up, their anxiety got their LPS went up, their anxiety got really severe. And in fact, they could really severe. And in fact, they could then use that as a predictive model.

then use that as a predictive model. They can then predict someone's severity They can then predict someone's severity of anxiety and depression and presence of anxiety and depression and presence of anxiety and depression by just of anxiety and depression by just looking at LPS in circulation. Right? So looking at LPS in circulation. Right? So this is a core indicator of what's this is a core indicator of what's driving your risk of anxiety and driving your risk of anxiety and depression. The presence of LPS in depression. The presence of LPS in circulation means you have leaky gut.

circulation means you have leaky gut. The clinical term for that is The clinical term for that is endotoxmia, endotoxmia, endotoxmia, right? And so the so the presence of right? And so the so the presence of endotoxmia, a leaky gut means you're endotoxmia, a leaky gut means you're going to be much more susceptible to going to be much more susceptible to anxiety and depression. We could talk anxiety and depression. We could talk about why LPS creates anxiety and about why LPS creates anxiety and depression. There's a number of depression. There's a number of mechanisms there, but I think the mechanisms there, but I think the underlying message is that a underlying message is that a dysfunctional gut is the biggest driver dysfunctional gut is the biggest driver of anxiety and depression, right? So, of anxiety and depression, right? So, somebody's been exposed to loads of somebody's been exposed to loads of toxins and mold and they've got a toxins and mold and they've got a dysfunctional gut. Uh, and they've dysfunctional gut. Uh, and they've probably been doing things to try to probably been doing things to try to cleanse themselves of the of these cleanse themselves of the of these issues on their own. you know, issues on their own. you know, they're finding things online and they're going finding things online and they're going through all these random detox protocols through all these random detox protocols and all the many of them that can that and all the many of them that can that can be harsh without working with the can be harsh without working with the clinician. Um, they're probably causing clinician. Um, they're probably causing more harm than good on their gut there, more harm than good on their gut there, thereby continuously increasing their thereby continuously increasing their leaky gut uh and then making them much leaky gut uh and then making them much more susceptible to this anxiety and more susceptible to this anxiety and depression. So, they have to have to fix depression. So, they have to have to fix the lining of the gut. They have to stop the lining of the gut. They have to stop that permeability in order to get that permeability in order to get control of that mood disorder.

control of that mood disorder. >> Yeah. I love that leaky gut is so much >> Yeah. I love that leaky gut is so much more than just zulin, but also these more than just zulin, but also these labs, you know, labs and endotoxmia labs, you know, labs and endotoxmia markers and things like that. Sometimes markers and things like that. Sometimes someone could even look fine on standard someone could even look fine on standard labs. Just as a reminder for the labs. Just as a reminder for the audience, you know, functional labs like audience, you know, functional labs

like a gut testing can pick up on these sort a gut testing can pick up on these sort of things, but standard labs sometimes of things, but standard labs sometimes will not. But yeah, we talk also about will not. But yeah, we talk also about with the endotoxins, there can be that with the endotoxins, there can be that environmental exposure as well from environmental exposure as well from bacteria and the environment and the bacteria and the environment and the gram negative bacteria putting off the gram negative bacteria putting off the endotoxins. But we have to remember that endotoxins. But we have to remember that one of those constant sources of one of those constant sources of potential endotoxmia and LPS is your potential endotoxmia and LPS is your gut. It's it's inherent to the gut. So gut. It's it's inherent to the gut. So that just is underscoring the fact that that just is underscoring the fact that that gut lining in the terrain is so that gut lining in the terrain is so important to to heal and that's why I important to to heal and that's why I really do that first even with clients really do that first even with clients before trying to do any kind of detox before trying to do any kind of detox protocols. We work on stabilizing the protocols.

Five Pillars for Healing the Gut

We work on stabilizing the gut lining. So and what are some of the gut lining. So and what are some of the things or compounds or ingredients that things or compounds or ingredients that are most useful to do that?

are most useful to do that? >> Yeah. and and and it's great that you do >> Yeah. and and and it's great that you do that first because of course the gut that first because of course the gut also plays a significant role in the also plays a significant role in the detox process in the body, right? And so detox process in the body, right? And so if your gut is really dismantled and you if your gut is really dismantled and you start pushing a lot of detoxification, start pushing a lot of detoxification, you can actually create even more you can actually create even more issues. And so stabilizing the gut to a issues. And so stabilizing the gut to a certain degree is a is a is a really certain degree is a is a is a really smart thing to do. Um, for me there, you smart thing to do. Um, for me there, you know, I I really look at I I boil it know, I I really look at I I boil it down to kind of five pillars. Um, down to kind of five pillars. Um, because part of of improving the gut, because part of of improving the gut, which is a ecosystem, is a number of which is a ecosystem, is a number of small decisions that accumulate to drive small decisions that accumulate to drive the ecosystem forward, right? Um, it's the ecosystem forward, right? Um, it's not going to be one or one one or two not going to be one or one one or two magical things. It's going to be uh a magical things. It's going to be uh a number of things that are kind of number of things that are kind of synergistic that work together to move synergistic that work together to move the the ecosystem in the right the the ecosystem in the right direction. Um so when I'm you know direction. Um so when I'm you know teaching people about this when it's teaching people about this when it's when it's consumers um I I do it as a when it's consumers um I I do it as a five pillar systems when it's clinicians five pillar systems when it's clinicians we get into much more in-depth u we get into much more in-depth u discussions about this but if we break discussions about this but if we break it down into kind of five pillars of the it down into kind of five pillars of the things that you should be doing um you things that you should be doing um you know pillar number one is food right so know pillar number one is food right so food moves the microbiome more so than food moves the microbiome more so than almost anything. So what you eat really almost anything. So what you eat really matters and and as much as you can based matters and and as much as you can based on your existing sensitivities and all on your existing sensitivities and all that, you know, diversify your diet and that, you know, diversify your diet and get as much fiber and polyphenols in get as much fiber and polyphenols in your system, right? Fiber is kind of the your system, right? Fiber is kind of the it's getting more popular, thank it's getting more popular, thank goodness. Uh but it's but it's a bit of goodness. Uh but it's but it's a bit of an unsung hero in in our world, right?

an unsung hero in in our world, right? Um it it hasn't been sexy or that Um it it hasn't been sexy or that exciting to talk about fiber for the exciting to talk about fiber for the most part, right? It's not as as sexy as most part, right? It's not as as sexy as all these amazing peptides and all these all these amazing peptides and all these space age things that people do. Uh but space age things that people do. Uh but but you know if I were to tell people but you know if I were to tell people that hey I I have a pill I invented a that hey I I have a pill I invented a pill that if you take it every day cuts pill that if you take it every day cuts your risk of dying from anything by 50%.

your risk of dying from anything by 50%. Right? People would be would jump at the Right? People would be would jump at the opportunity to buy this pill right and opportunity to buy this pill right and it would be a trillion dollar product it would be a trillion dollar product because what else cuts your risk of because what else cuts your risk of

dying from any disease by 50% almost?

dying from any disease by 50% almost? The only thing is fiber, right? So The only thing is fiber, right? So upwards of a million subjects, upwards of a million subjects, metaanalysis studies as as recent as metaanalysis studies as as recent as 2021, 2022 has shown that for every 10 2021, 2022 has shown that for every 10 gram of fiber you add to your daily gram of fiber you add to your daily diet, you reduce your all-c cause diet, you reduce your all-c cause mortality that's dying from anything by mortality that's dying from anything by 10%. And that goes all the way up to 10%. And that goes all the way up to almost 40 to 50 grams of fiber, 40 to almost 40 to 50 grams of fiber, 40 to 50% reduction in all cause mortality.

50% reduction in all cause mortality. Right? So we have that access. And why Right? So we have that access. And why is that? I mean, we don't digest the is that? I mean, we don't digest the fiber. we don't get any nutrition out of fiber. we don't get any nutrition out of it. It's cuz it feeds the microbiome, it. It's cuz it feeds the microbiome, right? Um it's and and not only does it right? Um it's and and not only does it feed the microbiome and helps this the feed the microbiome and helps this the bacteria, the right bacteria bacteria, the right bacteria proliferate, it creates all of this proliferate, it creates all of this metabolic byproducts like short- chain metabolic byproducts like short- chain fatty acids and and so on, right? Which fatty acids and and so on, right? Which are very nourishing, which are very are very nourishing, which are very reparative of the lining of the gut of reparative of the lining of the gut of the microbiome. So polyphenols also very the microbiome. So polyphenols also very similar. They're also prebiotics. They similar. They're also prebiotics. They also feed the microbiome. They also get also feed the microbiome. They also get converted into really important converted into really important compounds like say urolithins, right?

compounds like say urolithins, right? That that repair your mitochondria and That that repair your mitochondria and do all these important things. So, so do all these important things. So, so step one is uh food. You know, diversify step one is uh food. You know, diversify your diet as much as you can. Add as your diet as much as you can. Add as much as you can fiber slowly and much as you can fiber slowly and incrementally. You don't want to go from incrementally. You don't want to go from the 8 grams a day that an average the 8 grams a day that an average American does to 50 tomorrow. You're American does to 50 tomorrow. You're going to be really pissed off. Um so, going to be really pissed off. Um so, you want to go, you know, five grams a you want to go, you know, five grams a week. Just keep adding it up. Um so week. Just keep adding it up. Um so fiber and polyphenols the second part of fiber and polyphenols the second part of it is stress management right so there it is stress management right so there was a 2015 publication in frontiers of was a 2015 publication in frontiers of immunology that talked about how stress immunology that talked about how stress induced endotoxmia that is leaky gut induced endotoxmia that is leaky gut that comes about as a result of stress that comes about as a result of stress uh and I can explain all the mechanisms uh and I can explain all the mechanisms behind it but I'll I can I can tell you behind it but I'll I can I can tell you with a very high degree of confidence with a very high degree of confidence that stress is probably one of the that stress is probably one of the biggest drivers of endotoxim leaky gut biggest drivers of endotoxim leaky gut um and they showed that stress induced um and they showed that stress induced leaky gut was the number one cause of leaky gut was the number one cause of mortality and morbidity worldwide.

mortality and morbidity worldwide. Right? Because here's the tie, right? So Right? Because here's the tie, right? So stress creates leaky gut and endotoxmia.

stress creates leaky gut and endotoxmia. What we talked about the LPS getting in What we talked about the LPS getting in to circulation that LPS getting into to circulation that LPS getting into circulation is the number one driver of circulation is the number one driver of most chronic conditions. So anxiety, most chronic conditions. So anxiety, depression, Alzheimer's, uh dementia, um depression, Alzheimer's, uh dementia, um cardiovascular disease, diabetes, you cardiovascular disease, diabetes, you know, even the American Diabetic know, even the American Diabetic Association has published that Association has published that endotoxmia and the leaking in of LPS is endotoxmia and the leaking in of LPS is the what they call the primary insult the what they call the primary insult that starts the process of insulin that starts the process of insulin resistance, right? Cancers, autoimmune resistance, right? Cancers, autoimmune conditions. So the vast majority of conditions. So the vast majority of things that kill us from a disease things that kill us from a disease perspective are enhanced significantly perspective are enhanced significantly by that endotoxmia.

by that endotoxmia. And so managing stress is not just this And so managing stress is not just this kind of new age like you know uh um kind of new age like you know uh um thing that it's it's a very serious part thing that it's it's a very serious part of any recovery process, right? And then of any recovery process, right? And then the question maybe how do you manage the question maybe how do you manage stress? Well, there's tons of tools out stress? Well, there's tons of tools out there and I you know we could we could there and I you know we could we could have a whole conversation about that, have a whole conversation about that, but uh I'm sure I'm sure you've but uh I'm sure I'm sure you've addressed that in in your podcast many addressed that in in your podcast many of times. And so so diet, stress of times. And so so diet, stress management. The third one is more about management. The third one is more about um u lifestyle components that are um u lifestyle components that are critical to a healthy microbiome. So critical to a healthy microbiome. So actually exercise and resistance actually exercise and resistance training are both really important. So training are both really important. So when I say exercise, I mean getting out when I say exercise, I mean getting out there for walks, kind of zone to there for walks, kind of zone to cardiovascular exercise. And then cardiovascular exercise. And then resistance training is also really resistance training is also really important because um when you lift important because um when you lift weights and you contract your muscles, weights and you contract your muscles, they release chemical compounds called they release chemical compounds called myioines. And these myioines actually myioines. And these myioines actually have a direct impact on the gut have a direct impact on the gut microbiome and the lining of your gut.

microbiome and the lining of your gut. Right? So when you're stressed from Right? So when you're stressed from pillar number two, one of the really pillar number two, one of the really easy things to do is go and s start easy things to do is go and s start doing burpees, right? I I I I give doing burpees, right? I I I I give people this uh recommendation all the people this uh recommendation all the time uh is when you feel like when you time uh is when you feel like when you feel that fight or flight coming on, feel that fight or flight coming on, right? Um, if you can, like let's say right? Um, if you can, like let's say you're sitting in a car, so you can't you're sitting in a car, so you can't just start doing burpees. Start tensing just start doing burpees. Start tensing and releasing your muscles, right? Your and releasing your muscles, right? Your larger muscles, your glutes, your quads, larger muscles, your glutes, your quads, even you're just sitting there like even you're just sitting there like contract them, hold them, and release contract them, hold them, and release them, right? If you're in your office or a place where you can do it, just do a wall sit, right? Uh, till your till your wall sit, right? Uh, till your till your muscles burn. Um, or do push-ups or burpees. There's a direct connection.

burpees. There's a direct connection. Number one, because fight or flight is increasing blood profusion, increasing blood profusion, catakolamines, all of these things to catakolamines, all of these things to get you to fight or flee, right? Um, so your body is built up to move at that point, right? And one of the ways to exhaust that is to actually do some sort of movement, right? You're tricking your mind into going, "Okay, I'm fighting." And then now I need to come down from it once you stop the movement, right? Um, so that's an innate uh programming that that gets you to go cuz if you just sit there in it >> and you just keep freaking out. Exactly.

>> and you just keep freaking out. Exactly. Keep print out. Your body is going, "Okay, we're not fighting or fleeing." Like, "What's going on?" Right. Cuz your body thinks you're in danger. And so if you burn off some of that energy, it actually thinks you ran away from whatever the danger is and now you're coming down from it, right? It >> resolves it. Yeah, >> it resolves it. So that's one of the things. And then the other aspect of it is that those muscle contractions release those mioines and those myioines have a calming effect on your body.

have a calming effect on your body. Again, that's part of counteracting the fight orflight response, right? Um so so exercise um is one of those key

exercise um is is one of those key components. And then sleep is another components. And then sleep is another key component. Your microbiome is a key component. Your microbiome is a works on a dural system, meaning it works on a dural system, meaning it works on a 24-hour clock just like our works on a 24-hour clock just like our body does. And there's a lot of body does. And there's a lot of housekeeping work that has to happen at housekeeping work that has to happen at night when you're sleeping to increase night when you're sleeping to increase the diversity of your microbiome. So if the diversity of your microbiome. So if you don't sleep adequately, you're you don't sleep adequately, you're actually shortening that housekeeping actually shortening that housekeeping time and you don't get all the repair time and you don't get all the repair that's supposed to occur in your gut.

that's supposed to occur in your gut. Now that repair also extends beyond your Now that repair also extends beyond your gut. For example, your gut produces gut. For example, your gut produces something called BDNF, brain derived something called BDNF, brain derived neurotropic factor, which is really neurotropic factor, which is really important because that BDNF repairs your important because that BDNF repairs your brain while you're sleeping, right? Cuz brain while you're sleeping, right? Cuz throughout the day, your brain went throughout the day, your brain went through had a bunch of damage to it from through had a bunch of damage to it from inflammation, from toxicity and all inflammation, from toxicity and all that, your brain gets repaired overnight that, your brain gets repaired overnight through BDNF while you're sleeping so through BDNF while you're sleeping so that you wake up the next morning with that you wake up the next morning with the same brain that you had the day the same brain that you had the day before. If you don't sleep adequately, before. If you don't sleep adequately, you don't get that BDNF upregulation in you don't get that BDNF upregulation in your gut microbiome. You're going to your gut microbiome. You're going to wake up with a brain that's a little bit wake up with a brain that's a little bit more damaged than the day before, right?

more damaged than the day before, right?

Butyrate, Fiber, and Microbiome Support

And you could see quickly how that can And you could see quickly how that can accumulate uh time after time, day after accumulate uh time after time, day after day. So, so pillar number three is the day. So, so pillar number three is the exercise and sleep. Pillar number four exercise and sleep. Pillar number four is what I call exposure. So, you want to is what I call exposure. So, you want to reduce your exposure to things that harm reduce your exposure to things that harm your microbiome, right? So, you think your microbiome, right? So, you think about processed foods, all of the about processed foods, all of the personal care products that are loaded personal care products that are loaded with antimicrobials, over sterilization with antimicrobials, over sterilization of your environment, using all these of your environment, using all these chlorine based cleansers to clean your chlorine based cleansers to clean your desk and places like that that don't desk and places like that that don't need to be sterilized. All of that is need to be sterilized. All of that is negative exposure to your microbiome.

negative exposure to your microbiome. And then positive exposure to your And then positive exposure to your microbiome is getting outside in nature, microbiome is getting outside in nature, getting among people. I'm a big hugger.

getting among people. I'm a big hugger. Um, you know, you want to interact with Um, you know, you want to interact with people. You want to get together in people. You want to get together in small groups with with other people as small groups with with other people as much as you can because we're all much as you can because we're all sharing microbes and you want to get out sharing microbes and you want to get out in the natural environment as much as in the natural environment as much as you can because we're sharing microbes.

you can because we're sharing microbes. And then the last bit is And then the last bit is supplementation. Uh, and the reason why supplementation. Uh, and the reason why I put pillar number five as I put pillar number five as supplementation is because you actually supplementation is because you actually cannot outs supplement your way of not cannot outs supplement your way of not doing the first four pillars, right? Um, doing the first four pillars, right? Um, the supplementation is a massive the supplementation is a massive enhancement to the other things you're enhancement to the other things you're doing. And so it can really move the doing. And so it can really move

the needle, but it doesn't move things much needle, but it doesn't move things much if you're not doing this first four if you're not doing this first four things. Um, so with supplementation, the things. Um, so with supplementation, the sporebased probiotics, the megaspore we sporebased probiotics, the megaspore we were talking about, uh, we've published were talking about, uh, we've published studies on on reducing endotoxmia studies on on reducing endotoxmia significantly. I love imoglobulins, IGG, significantly. I love imoglobulins, IGG, especially in the detox world, because especially in the detox world, because they bind all kinds of toxins. Um, not they bind all kinds of toxins. Um, not only LPS, but they bind mold toxins and only LPS, but they bind mold toxins and environmental toxins, and I'll then take environmental toxins, and I'll then take the toxygenic load off the system and the toxygenic load off the system and take it out through defecation. Um, I take it out through defecation. Um, I love prebiotics, oligosaccharide based love prebiotics, oligosaccharide based prebiotics to feed the keystone prebiotics to feed the keystone bacteria. Lactopherin is actually a bacteria. Lactopherin is actually a fantastic compound as well, right? Uh, fantastic compound as well, right? Uh, of course, it helps with iron and of course, it helps with iron and ferotin and anemia, but but also more ferotin and anemia, but but also more importantly, lactopherin is a very importantly, lactopherin is a very important component of your immune important component of your immune system [clears throat] and actually system [clears throat] and actually directly binds LPS in the gut as well.

directly binds LPS in the gut as well. Another unsung hero in this world and Another unsung hero in this world and you may you may be using it in your you may you may be using it in your practice is yeast beta glucan. um and practice is yeast beta glucan. um and and not for the the conventional idea of and not for the the conventional idea of immune stimulation that people think immune stimulation that people think about because when you know you think about because when you know you think about yeast betalucan you think like oh about yeast betalucan you think like oh colds and flu right I can shorten the colds and flu right I can shorten the duration of my colds and flu it does duration of my colds and flu it does that but that's not the part that's that but that's not the part that's interesting at all to me because like interesting at all to me because like lots of other things can shorten lots of other things can shorten duration of colds and flu yeast duration of colds and flu yeast betaglucan does one thing that it's the betaglucan does one thing that it's the only compound known to do right there's only compound known to do right there's no other research on any other compound no other research on any other compound in the world that does this right and it in the world that does this right and it trains the im innate immune system right trains the im innate immune system right that's a very novel concept so okay it's that's a very novel concept so okay it's and it's called trained immunity right and it's called trained immunity right now here's why it's novel for for for now here's why it's novel for for for those listening that don't know the those listening that don't know the separation between the the immune uh separation between the the immune uh system so you've got the innate immune system so you've got the innate immune system which is the first actors they system which is the first actors they act fast they have non-specific tools act fast they have non-specific tools and then you've got the adaptive immune and then you've got the adaptive immune system which is the memory the much more system which is the memory the much more precision actors right when you get sick precision actors right when you get sick and you feel all the inflammation and and you feel all the inflammation and fever and pains and aches and all that, fever and pains and aches and all that, that's the innate immune system doing that's the innate immune system doing its thing, right? Uh and and the innate its thing, right? Uh and and the innate immune system is akin to like say immune system is akin to like say there's a bunch of bugs that flew into there's a bunch of bugs that flew into your your room because a window's open, your your room because a window's open, you're trying to kill the bugs. It's you're trying to kill the bugs. It's like using a blowtorrch to kill the like using a blowtorrch to kill the bugs, right? You're going to kill the bugs, right? You're going to kill the bugs, but you're also burning the wall bugs, but you're also burning the wall to a certain degree, right? But that's to a certain degree, right? But that's the innate immune system. They get there the innate immune system. They get there fast. They use blow torches. They just fast. They use blow torches. They just destroy things in a given area and and destroy things in a given area and and then the adaptive immune system comes then the adaptive immune system comes along goes, "Hey, what was that thing along goes, "Hey, what was that thing that causes the problem, part of the that causes the problem, part of the innate immune system presents what it innate immune system presents what it thinks was the problem. The adaptive thinks was the problem. The adaptive immune system goes, "Aha, we know what immune system goes, "Aha, we know what that is now. We're going to build memory that is now. We're going to build memory against it. So next time we see it, we against it. So next time we see it, we can deal with it much faster." Right? Uh can deal with it much faster." Right? Uh that's immunity. Adaptive immunity that that's immunity. Adaptive immunity that most people kind of understand to a most people kind of understand to a certain degree. What most people don't certain degree. What most people don't understand is that the innate immune understand is that the innate immune system can also have memory

and can also system can also have memory and can also be trained to respond to things that it be trained to respond to things that it has seen before in a much cleaner, has seen before in a much cleaner, faster fashion, right? And that's faster fashion, right? And that's actually called trained immunity. And actually called trained immunity. And that training actually occurs with the that training actually occurs with the macrofasages and dendritic cells within macrofasages and dendritic cells within your body. And there's only one compound your body. And there's only one compound ever shown to increase trained immunity ever shown to increase trained immunity and that is yeast beta glucan. Right? So and that is yeast beta glucan. Right? So next time the same uh toxin is next time the same uh toxin is encountered uh the same virus is encountered uh the same virus is encountered and all that your encountered and all that your macrofasages and dendritic cells can macrofasages and dendritic cells can actually recognize it faster deal with actually recognize it faster deal with it faster with less inflammation cuz it faster with less inflammation cuz normally when when your when your normally when when your when your macrofasages and dendritic cells see macrofasages and dendritic cells see something that they think is bad and something that they think is bad and they deal with it they also fire up the they deal with it they also fire up the inflammatory cascades and recruit other inflammatory cascades and recruit other innate immune cells to the region right innate immune cells to the region right natural killer cells and uh so on right natural killer cells and uh so on right CD CD8 T cells and so on. And so it CD CD8 T cells and so on. And so it creates this big inflammatory response.

creates this big inflammatory response. But a trained immune system gets better But a trained immune system gets better at recognizing those problems and at recognizing those problems and dealing with it with less and less dealing with it with less and less damage, right? So so yeast betalucan is damage, right? So so yeast betalucan is a is a little bit of a secret weapon uh a is a little bit of a secret weapon uh in in in uh immune um science and immune in in in uh immune um science and immune biology. Um so those are kind of the top biology. Um so those are kind of the top things that I love. There's probably a things that I love. There's probably a lot more that I'm not mentioning, but um lot more that I'm not mentioning, but um but I think if people even paid but I think if people even paid attention to those, that's that's a huge attention to those, that's that's a huge huge array of tools.

huge array of tools. >> Yeah. So much gold there. So, I just >> Yeah. So much gold there. So, I just want to revisit a couple things, but one want to revisit a couple things, but one is the short chain fatty acids because I is the short chain fatty acids because I have to confess that butyrate, a short have to confess that butyrate, a short chain fatty acid, is a bit of an chain fatty acid, is a bit of an obsession for me in my world. They obsession for me in my world. They patients have the worn down gut barrier.

patients have the worn down gut barrier. The immune system stuck in inflammation The immune system stuck in inflammation and then butyrate. We've got butyrate and then butyrate. We've got butyrate being a fuel for the cells lining the being a fuel for the cells lining the colon helping to hold the gut barrier colon helping to hold the gut barrier tight and also calming the immune system tight and also calming the immune system down. So, it makes me really curious down. So, it makes me really curious where you think the science is going as where you think the science is going as far as from the microbiome expert side.

far as from the microbiome expert side. Would there be any future for maybe Would there be any future for maybe targeted butyrate producing strains targeted butyrate producing strains because there's only a few that will because there's only a few that will reduce butyrate or for any combo reduce butyrate or for any combo products or anything that that you've products or anything that that you've been exploring with regard to butyrate.

been exploring with regard to butyrate. Yeah, we actually did some work on this Yeah, we actually did some work on this and we we published some some work when and we we published some some work when I was at Microbiome Labs on this itself I was at Microbiome Labs on this itself and and I share your obsession with and and I share your obsession with butyrate uh and short- chain fatty acids butyrate uh and short- chain fatty acids in general because you know there are in general because you know there are three compounds but propane and acetate three compounds but propane and acetate right and they do so many things it's right and they do so many things it's mindboggling mindboggling mindboggling um on my skin microbiome side I've been um on my skin microbiome side I've been focusing a lot on acetate because focusing a lot on acetate because acetate seems to work in the periphery acetate seems to work in the periphery in skin and and actually I was I in skin and and actually I was I received a US patent on utilizing received a US patent on utilizing acetate from the gut to to heal

acne.

acetate from the gut to to heal acne. Um, and so, you know, so these are Um, and so, you know, so these are powerful compounds. Butyrate, like you powerful compounds. Butyrate, like you said, uh, is critically important for said, uh, is critically important for metabolic health. It's critically metabolic health. It's critically important for the lining of your gut, important for the lining of your gut, the structural elements of the lining of the structural elements of the lining of the gut. It's really important for the gut. It's really important for building the mucin layer, which is which building the mucin layer, which is which is a very important protective layer of is a very important protective layer of the lining of your gut, and in fact, the lining of your gut, and in fact, where all the action takes place. That's where all the action takes place. That's where most of your microbes live and you where most of your microbes live and you need butyrate to feed the goblet cells need butyrate to feed the goblet cells that make the mucin. You also and u you that make the mucin. You also and u you know I'm not sure a lot of people are know I'm not sure a lot of people are aware of this butyrate is also one of aware of this butyrate is also one of the primary fuels for your your micro the primary fuels for your your micro macrofasages and dendritic cells that macrofasages and dendritic cells that are circulating around to protect you.

are circulating around to protect you. Right? So with inadequate butyrate Right? So with inadequate butyrate you're actually not fueling these you're actually not fueling these peripheral immune cells. Um so so peripheral immune cells. Um so so butyrate is critically important. the butyrate is critically important. the thing about butyrate. So, and I like thing about butyrate. So, and I like butyrate supplements, right? So, there's butyrate supplements, right? So, there's a product like tributery that I think a product like tributery that I think works well um and it and it definitely works well um and it and it definitely helps when someone's not making enough helps when someone's not making enough indogenous butyrate. It can never indogenous butyrate. It can never replace endogenous butyrate, right? And replace endogenous butyrate, right? And the reason for that is butyrate is made the reason for that is butyrate is made in in many different sections of the in in many different sections of the colon. Um and in the different sections colon. Um and in the different sections of the colon, it gets utilized slightly of the colon, it gets utilized slightly differently. and and and then also it it differently. and and and then also it it becomes a precursor to the other two becomes a precursor to the other two short- chain fatty acids acetate and short- chain fatty acids acetate and propionate which are also important propionate which are also important right um so there's interchange between right um so there's interchange between those those short- chain fatty acids so those those short- chain fatty acids so you do want to maximize your indogenous you do want to maximize your indogenous butyrate production um we did uh a study butyrate production um we did uh a study that we published on the use of the that we published on the use of the spores in megaspore with the prebiotic spores in megaspore with the prebiotic right so we what we showed is that when right so we what we showed is that when you put megaspore into you put megaspore into an average microbiome that's that's not an average microbiome that's that's not producing great amounts of butyrate and producing great amounts of butyrate and short- chain fatty acids, we can short- chain fatty acids, we can increase the amount of butyrate increase the amount of butyrate production by 50%. Uh when we add the production by 50%. Uh when we add the prebiotic, it goes to 150%. And so the prebiotic, it goes to 150%. And so the combination of oligosaccharides and the combination of oligosaccharides and the spores is a massive uh you know spores is a massive uh you know stimulation for indogenous butyrate stimulation for indogenous butyrate production, right? And so, but then you production, right? And so, but then you hear all these people talk about, you hear all these people talk about, you know, grass-fed butter and putting it in know, grass-fed butter and putting it in coffee and things like try to get coffee and things like try to get butyrate that way. It's not a great butyrate that way. It's not a great source of butyrate. What you really want source of butyrate. What you really want to do is get your indogenous butyrate to do is get your indogenous butyrate levels up, right? So, in that case, it's levels up, right? So, in that case, it's it's a the oligosaccharides are a it's a the oligosaccharides are a fantastic way to do it. Now the fantastic way to do it. Now the difference between oligosaccharides and difference between oligosaccharides and like regular fiber is that like regular fiber is that oligosaccharides are much more oligosaccharides are much more specialized complex carbohydrate specialized complex carbohydrate structures that feed very narrow ranges structures that feed very narrow ranges of microbes. And these oligosaccharides of microbes. And these oligosaccharides like FOS, go XOS feed keystone species like FOS, go XOS feed keystone species and they feed a lot of the butyrate and they feed a lot of the butyrate producers. Um you know versus fiber producers. Um you know versus fiber feeds a lot of different bacteria in feeds a lot of different bacteria in your gut which is important and good but your gut which is important and good but if you want to get your butyrate up if you want to get your butyrate up those oligosaccharides are going to be those oligosaccharides are going to be really

important. And then to increase really important. And then to increase the utilization of the ilosaccharides, the utilization of the ilosaccharides, add in the spores and you'll start add in the spores and you'll start getting a tremendous amount of getting a tremendous amount of indogenous butyrate production. I would indogenous butyrate production. I would also caution people on stool testing for also caution people on stool testing for butyrate. Um because a lot of times we butyrate. Um because a lot of times we use that as a measure of like, oh, how use that as a measure of like, oh, how much butyrate are they producing? That's much butyrate are they producing? That's proven to be a little bit, you know, proven to be a little bit, you know, like like like disconnected from what's actually disconnected from what's actually happening in the gut, right? Um I don't happening in the gut, right? Um I don't know, are you familiar with that? Uh know, are you familiar with that? Uh >> yeah, absolutely. I mean, I always take >> yeah, absolutely. I mean, I always take it in context because many times I'd see it in context because many times I'd see the butyrate levels on the gut testing the butyrate levels on the gut testing are very low, but I always take it in are very low, but I always take it in context of symptoms or even if they're context of symptoms or even if they're normal, right? Like what are their normal, right? Like what are their symptoms? You know, what what exposures symptoms? You know, what what exposures do they have? And it always has to be do they have? And it always has to be taken in context. For sure.

taken in context. For sure. >> Yeah, for sure. And and and where this >> Yeah, for sure. And and and where this where this um kind of paradox came about where this um kind of paradox came about is, you know, we know butyrate is is, you know, we know butyrate is metabolically really important, right?

metabolically really important, right? So, so it it controls blood sugar, So, so it it controls blood sugar, satiety, hormones, all of that kind of satiety, hormones, all of that kind of stuff. So, it's it's quite natural that stuff. So, it's it's quite natural that lean people would be making plenty of lean people would be making plenty of butyrate as as a as a key part of how butyrate as as a as a key part of how they're staying lean and metabolically they're staying lean and metabolically healthy. And thereby uh overweight healthy. And thereby uh overweight individuals or obese individuals would individuals or obese individuals would be making less butyrate. And that's we be making less butyrate. And that's we know that to be true when you look at know that to be true when you look at microbiome sampling of lean versus obese microbiome sampling of lean versus obese individuals. But then when they they individuals. But then when they they started studying butyrate in stool uh started studying butyrate in stool uh and they found that obese individuals and they found that obese individuals had much higher butyrate in stool than had much higher butyrate in stool than lean individuals right and that created lean individuals right and that created a bit of a paradox because it's like a bit of a paradox because it's like wait a minute are they producing more is wait a minute are they producing more is that why well actually so stool is an that why well actually so stool is an excoratory component right so it's excoratory component right so it's they're they're excreting more butyrate they're they're excreting more butyrate maybe they're not even utilizing as much maybe they're not even utilizing as much right so that may be why you're seeing right so that may be why you're seeing more in stool and and they're producing more in stool and and they're producing it maybe in different regions of the gut it maybe in different regions of the gut this is why I talked talked about all this is why I talked talked about all the different parts of the colon being the different parts of the colon being really important. So maybe obese really important. So maybe obese individuals are producing more in the individuals are producing more in the distal colon that's not getting absorbed distal colon that's not getting absorbed in the rest of the body and it's coming in the rest of the body and it's coming out more in stool, right? Because stool out more in stool, right? Because stool is often a a sampling what's really is often a a sampling what's really happening in the distal colon. Um so so happening in the distal colon. Um so so we want to caution about that and I we want to caution about that and I would just say about butyrate like would just say about butyrate like there's no reason not to try to push there's no reason not to try to push everyone to maximize butyrate everyone to maximize butyrate production, right? There's there's no production, right? There's there's no downside to it, right? So even testing downside to it, right? So even testing it's kind of like all right no matter it's kind of like all right no matter what the test says let's maximize what the test says let's maximize butyrate you know it's one of those butyrate you know it's one of those things that are just really really good things that are just really really good for you overall.

for you overall. >> Absolutely. And then cuz you know there >> Absolutely. And then cuz you know there are those producers of butyrate like the are those producers of butyrate like the bacteria that actually produce it but a bacteria that actually produce it but a lot of those are not easy to make shelf lot of those are not easy to make shelf stable right to actually have like a stable right to actually have like a butyrate producing probiotic butyrate producing

probiotic >> probiotic. Yeah, I I had one. So I had a >> probiotic. Yeah, I I had one.

Mindset, Identity, and Recovery

So I had a a strain called uh butery caucus a strain called uh butery caucus polycum. Uh but caucus polycum is a polycum. Uh but caucus polycum is a butyrate producer that lives in your butyrate producer that lives in your seeum. Um and and it it is one of the seeum. Um and and it it is one of the highest butyrate producers. It is a highest butyrate producers. It is a strict anorob. That's why they're strict anorob. That's why they're unstable. Most of these butyate unstable. Most of these butyate producers in fact all of them are producers in fact all of them are anorobic bacteria which means oxygen is anorobic bacteria which means oxygen is toxic to them. So imagine dealing with toxic to them. So imagine dealing with them in the outside environment, right?

them in the outside environment, right? production and encapsulation and all production and encapsulation and all that they're dying very quickly when that they're dying very quickly when they get exposed to oxygen. Uh but we they get exposed to oxygen. Uh but we found a way uh as one of the last things found a way uh as one of the last things I was doing at Microbiome Labs uh was we I was doing at Microbiome Labs uh was we had found a anorobic production system had found a anorobic production system where we could produce these um and and where we could produce these um and and um and and we could stabilize them and um and and we could stabilize them and and deliver them in capsule form to the and deliver them in capsule form to the large bowel. Um unfortunately at that large bowel. Um unfortunately at that point I I'd sold the business and then point I I'd sold the business and then the uh the new owners decided not to the uh the new owners decided not to continue with that um with that um continue with that um with that um particular project. That said uh I do I particular project. That said uh I do I do have the privilege and opportunity of do have the privilege and opportunity of sitting on lots of companies boards and sitting on lots of companies boards and being and consulted by a lot of being and consulted by a lot of companies who are in the microbiome companies who are in the microbiome space. I can tell you with great space. I can tell you with great certainty that there are new certainty that there are new technologies coming out in the next say technologies coming out in the next say 10 to 12 months that can take these type 10 to 12 months that can take these type of unstable strains and put them in a of unstable strains and put them in a matrix that perfectly stabilizes them matrix that perfectly stabilizes them and gets them to engraft. And some of and gets them to engraft. And some of these anorobes are coming out uh and and these anorobes are coming out uh and and you have you need a fraction of the dose you have you need a fraction of the dose because these ma these uh matrices that because these ma these uh matrices that they're putting them in are much more they're putting them in are much more sophisticated and they stabilize the sophisticated and they stabilize the organism. And so we will have um organism. And so we will have um supplemental butyrate producers supplemental butyrate producers um coming out that will engraft, meaning um coming out that will engraft, meaning that they will colonize permanently in that they will colonize permanently in your gut. And you can dramatically your gut. And you can dramatically increase your butyrate production increase your butyrate production through a probiotic that way. And and through a probiotic that way. And and these probiotics that that that we're these probiotics that that that we're talking about and working on are going talking about and working on are going to be uh once a week or once a month to be uh once a week or once a month probiotics. Like you only take it once a probiotics. Like you only take it once a month. You don't have to take it every month. You don't have to take it every day because they engraft and they stay day because they engraft and they stay for so long. So yes, there's some for so long. So yes, there's some exciting things coming out on that on exciting things coming out on that on that front.

that front. >> That is so exciting. I am really glad to >> That is so exciting. I am really glad to hear about that. I'll be looking forward hear about that. I'll be looking forward to seeing the latest on that. And for to seeing the latest on that. And for those listening, yeah, so just to those listening, yeah, so just to underscore, it's not just about, you underscore, it's not just about, you know, take a probiotic, any probiotic.

know, take a probiotic, any probiotic. It's about the resilience of your entire It's about the resilience of your entire gut on the inside from the whole entire gut on the inside from the whole entire tube and, you know, different phes and tube and, you know, different phes and different environments from, you know, different environments from, you know, mouth on down. And we need they need mouth on down. And we need they need different things and making the gut different things and making the gut resilient so that it produces its own resilient so that it produces its own butyrate is the ideal. So a lot of times butyrate is the ideal. So a lot of times we're dealing with constant

influx of we're dealing with constant influx of toxins and taking supplemental butyrate toxins and taking supplemental butyrate and everything to to combat that. But we and everything to to combat that. But we wanted to be from the gut ideally for wanted to be from the gut ideally for sure.

sure. sure. >> Yeah. Yeah. And and and a little bit of >> Yeah. Yeah. And and and a little bit of a um you know often overlooked component a um you know often overlooked component of all of this is is the liver, right?

of all of this is is the liver, right? So, so the liver and the gut kind of go So, so the liver and the gut kind of go hand in hand. So, the liver is a a hand in hand. So, the liver is a a natural part of the digestive system.

natural part of the digestive system. Um, and there's a significant influence Um, and there's a significant influence on the microbiome and the liver. Uh, on the microbiome and the liver. Uh, especially endotoxmia. So, we talked especially endotoxmia. So, we talked about that LPS that leaks through, about that LPS that leaks through, right? But 85% of all the LPS that leaks right? But 85% of all the LPS that leaks through goes to the liver first. And so, through goes to the liver first. And so, the liver has to deal with that massive the liver has to deal with that massive toxygenic load. Uh, the liver has a toxygenic load. Uh, the liver has a couple of tricks up its sleeve. It couple of tricks up its sleeve. It produces something called HDL3. It produces something called HDL3. It produces LBP. Uh these are compounds to produces LBP. Uh these are compounds to bind and try to neutralize the LPS bind and try to neutralize the LPS specifically because most of it ends up specifically because most of it ends up going to the liver. But as your liver going to the liver. But as your liver becomes dysfunctional, it can do that becomes dysfunctional, it can do that less and less and it can do that with less and less and it can do that with with uh you know with without the same with uh you know with without the same intensity. And so then you start getting intensity. And so then you start getting fatty liver and this is one of the fatty liver and this is one of the reasons why you know uh non-alcoholic reasons why you know uh non-alcoholic fatty liver disease or as it's now known fatty liver disease or as it's now known you know metabolic associated fatty you know metabolic associated fatty liver disease um is so prevalent right liver disease um is so prevalent right somewhere around 60 65% adults have it somewhere around 60 65% adults have it uh and then steattosis steepitis those uh and then steattosis steepitis those things are so prevalent now because our things are so prevalent now because our livers are undergoing a phenomenal livers are undergoing a phenomenal amount of stress from the toxicity amount of stress from the toxicity that's coming from the gut right Um, and that's coming from the gut right Um, and so, you know, you you want to think so, you know, you you want to think about supporting your liver, but then about supporting your liver, but then you also want to think about, you know, you also want to think about, you know, your gut to provide your liver with a your gut to provide your liver with a relief so that your gut doesn't start relief so that your gut doesn't start and continue to inundate the liver with and continue to inundate the liver with toxicity because anytime you're toxicity because anytime you're detoxing, you need your liver to do it detoxing, you need your liver to do it for you, right? So, um, that for you, right? So, um, that relationship, I think, you know, is not relationship, I think, you know, is not talked about enough out here in our talked about enough out here in our world of of health and wellness.

world of of health and wellness. >> Absolutely. Yeah, I definitely >> Absolutely. Yeah, I definitely appreciate that because yeah, we talk appreciate that because yeah, we talk about liver support because the liver is about liver support because the liver is our master detox organ, but it really our master detox organ, but it really all connects back to the gut. Yes.

all connects back to the gut. Yes. >> So, we talked about some underrated >> So, we talked about some underrated interventions already. Anything else interventions already. Anything else that we haven't addressed that would that we haven't addressed that would actually move the needle for people actually move the needle for people >> um on their gut microbiome?

>> um on their gut microbiome? >> Yeah. >> Yeah. >> Yeah. >> Yeah. Um I think a big thing is mindset, >> Yeah. Um I think a big thing is mindset, right? So, right? So, so we we create our reality quite a bit, so we we create our reality quite a bit, right?

right? right? >> Um, and I think one of the things I see >> Um, and I think one of the things I see very common in our space as I work with very common in our space as I work with clinicians and and their patients and clinicians and and their patients and and of course work I I I encounter and and of course work I I I encounter and engage

with lots and lots of people in engage with lots and lots of people in our both on social media, conferences our both on social media, conferences and all that. People will often embed and all that. People will often embed their identity with their condition, their identity with their condition, >> right?

>> right? >> right? um like let's say they've been suffering um like let's say they've been suffering with SIBO or mass cell or you know some with SIBO or mass cell or you know some condition like that they're effectively condition like that they're effectively introducing themselves as a mass cell introducing themselves as a mass cell sufferer or a SIBO person right they're sufferer or a SIBO person right they're that's so ingrained in their identity that's so ingrained in their identity that it becomes really hard to strip that it becomes really hard to strip that from your reality right we we all that from your reality right we we all know of the placebo effect and the power know of the placebo effect and the power of that right so I've done lots of of that right so I've done lots of clinical trials as you know and and one clinical trials as you know and and one of the things we're always trying to of the things we're always trying to work around is the power of the placebo work around is the power of the placebo effect. Um, you know, if your mind effect. Um, you know, if your mind believes something, it's going to change believes something, it's going to change your biology to make that happen. And your biology to make that happen. And and as a result of that, if your mind and as a result of that, if your mind believes you are sick and you are a sick believes you are sick and you are a sick person trying to get well all the time, person trying to get well all the time, you will remain a sick person, right?

you will remain a sick person, right? And and so really, you want to try to And and so really, you want to try to frame shift as much as you can. And I frame shift as much as you can. And I think there's a couple of things that think there's a couple of things that you would do with that. Number one is di you would do with that. Number one is di divorce the the diagnosis from you, divorce the the diagnosis from you, right? From your personality, right?

right? From your personality, right? You're not so and so with mass cell You're not so and so with mass cell activation, right? Syndrome. Um just activation, right? Syndrome. Um just just divorce your identity from that, just divorce your identity from that, right? U that's not your existence.

right? U that's not your existence. That's not your reality. It's just a That's not your reality. It's just a temporary thing that you're dealing temporary thing that you're dealing with. Um and it and and the second part with. Um and it and and the second part of it is is really around this um idea of it is is really around this um idea of um of um encountering every decision you make encountering every decision you make with that identity, right? So for with that identity, right? So for example, example, example, people with mass cell activation, right?

people with mass cell activation, right? If I talk to them about trying something If I talk to them about trying something or, you know, taking an approach to it, or, you know, taking an approach to it, their first response is almost always, their first response is almost always, I'm a I'm really sensitive to I'm a I'm really sensitive to everything. So, how am I going to react everything. So, how am I going to react to that? Just the fact that you've said to that? Just the fact that you've said that, you're going to react negatively, that, you're going to react negatively, right? It's going to happen, right? So, right? It's going to happen, right? So, so, so your body's going to absolutely so, so your body's going to absolutely do that, right? I just had that with uh do that, right? I just had that with uh with with somebody I was hanging out with with somebody I was hanging out with uh over the weekend. um you know with uh over the weekend. um you know she has mass cell activation and you she has mass cell activation and you know a little trauma occurred on on on a know a little trauma occurred on on on a part of a body and then that caused a part of a body and then that caused a little bit of nervousness because oh my little bit of nervousness because oh my god any sort of trauma will create an god any sort of trauma will create an activation in my body and then sure activation in my body and then sure enough from that nervousness on it enough from that nervousness on it occurred all throughout arms and all occurred all throughout arms and all that right so like so so I know this that right so like so so I know this this part is hard and it takes a lot of this part is hard and it takes a lot of mindfulness work and it takes a lot of mindfulness work and it takes a lot of work around the trauma that the work around the trauma that the condition has caused condition has caused But that's something really important to But that's something really important to pay attention to, right? Your body has pay attention to, right? Your body has an amazing capacity to heal. Um, it has an amazing capacity to heal. Um, it has an amazing capacity to drive healing if an amazing capacity to drive healing if your brain believes it, right? And and your brain believes it, right? And and that's the part that you really need to that's the part that you really need to get a handle of. Um, all the

other get a handle of. Um, all the other things we talked about are important things we talked about are important tools that can biochemically, you know, tools that can biochemically, you know, uh, microbiologically move the needle uh, microbiologically move the needle for you. But if your brain doesn't for you.

Where to Find Kieran and Final Thoughts

But if your brain doesn't believe it is, it can happen and that believe it is, it can happen and that that's not you and that's not you that's not you and that's not you dealing with this for the rest of your dealing with this for the rest of your life, it becomes really hard to to cure life, it becomes really hard to to cure or change your condition.

or change your condition. >> I 100% agree and I see that with >> I 100% agree and I see that with clients. I can tell who is going to heal clients. I can tell who is going to heal the quickest because it's the people who the quickest because it's the people who say those positive affirmations who who say those positive affirmations who who identify with healing and who don't identify with healing and who don't identify as like a moldy or other you identify as like a moldy or other you know identify like a mass cell sufferer know identify like a mass cell sufferer right and for those listeners who may right and for those listeners who may see my stories on Instagram and Facebook see my stories on Instagram and Facebook is where I put a lot of mindset is where I put a lot of mindset encouragement so I would encourage encouragement so I would encourage anyone one to check those out as well.

anyone one to check those out as well. So, thanks for that. That's definitely So, thanks for that. That's definitely amazing tips and advice. So, this has amazing tips and advice. So, this has been wonderful. Karen, thank you so much been wonderful. Karen, thank you so much for coming on the show. Where can the for coming on the show. Where can the listeners find you and your current listeners find you and your current work?

work? work? >> Yeah, well, thank you so much first of >> Yeah, well, thank you so much first of all for having me. I uh I it's never all for having me. I uh I it's never lost upon me the opportunity to talk lost upon me the opportunity to talk about what I do and and share about what I do and and share information and knowledge that I have.

information and knowledge that I have. that's that's my passion. This that's that's my passion. This information sitting in my head does information sitting in my head does nothing for anybody. Um and so it's it's nothing for anybody. Um and so it's it's it's always a privilege to have an it's always a privilege to have an opportunity to share it. So I thank you opportunity to share it. So I thank you for that. Um and you know so people can for that. Um and you know so people can learn more. So I I engage with people a learn more. So I I engage with people a lot on Instagram. Uh my handle is um lot on Instagram. Uh my handle is um Karen Biome Kir Rio M. But my new uh Karen Biome Kir Rio M. But my new uh place, the biome learning center, um place, the biome learning center, um there we we've got courses for consumers there we we've got courses for consumers and clinicians on the microbiome. Uh and clinicians on the microbiome. Uh we've got a circle community which is we've got a circle community which is free to join and then there's tiers of free to join and then there's tiers of different things and we've got lots of different things and we've got lots of practitioners in there and thousands of practitioners in there and thousands of consumers. Um and we provide a lot of consumers. Um and we provide a lot of education, learning material and all education, learning material and all that in the biome learning center. So that in the biome learning center. So that is biomec that is biomec bomc.com.

bomc.com. bomc.com. So that's another great resource and we So that's another great resource and we just launched it in uh February. So uh just launched it in uh February. So uh come and join us and join that community come and join us and join that community and then we'll continue to to put out uh and then we'll continue to to put out uh a lot more educational material and all a lot more educational material and all that so you can empower yourself to that so you can empower yourself to understand what the decisions are you understand what the decisions are you need to make dayto-day, right? Because need to make dayto-day, right? Because that's like my whole thing about the the that's like my whole thing about the the microbiome is that you know a healthy microbiome is that you know a healthy microbiome comes about from lots of microbiome comes about from lots of little decisions you're making every little decisions you're making every day, right? what you eat, what you put day, right? what you eat, what you put on, what you surround yourself with, on, what you surround yourself with, what you drink, all that stuff. That's what you drink, all that stuff. That's the stuff that ultimately cumulatively the stuff that

ultimately cumulatively moves the needle on things. So, you need moves the needle on things. So, you need to have a certain baseline level of to have a certain baseline level of knowledge and understanding to make knowledge and understanding to make those right decisions. Um, and so my those right decisions. Um, and so my goal is to provide people with baseline goal is to provide people with baseline level understanding about their level understanding about their microbiome and this ecosystem so they microbiome and this ecosystem so they understand what the right decisions are.

understand what the right decisions are. >> Amazing. Thanks, Kieran. And thank you >> Amazing. Thanks, Kieran. And thank you for being here on the Detox SAS Report.

for being here on the Detox SAS Report.