Introduction to the microbiome and fertility

Hello and welcome back to the Beyond Infertility Summit. I am one of your co-hosts, Dr. Carrie Jones, and today I am Beyond excited to have my good friend and famous microbiologist Kiran Krishnan on to talk about the microbiome and fertility as it relates to both men and women.

And you might be thinking to yourself, I have no idea. One, what a microbiome is or to how a microbiome might relate to my fertility. You're definitely going to want to listen up because I think it's going to blow your mind and tie a lot of pieces together.

So Kiran, welcome to the Summit. Hi Carrie, thank you so much for having me. Such an important topic. This whole idea of making other humans and and how difficult it can be these days.

Right. So I'm really excited to be able to talk about this from the microbiome perspective. Well, before we get started, why don't you give the listeners a little background and to you how you got into this.

And then I want to just jump right into fertility hormones, implantation, sperm health and how it relates to the gut. Because I just don't think a lot of people tie all that together.

And you I've heard you do it multiple times and I can't wait to ask. Yeah, absolutely. So, you know, for me, I grew up in a house of nerds. My mom is a medical doctor.

My dad is a microelectronics engineer. So engineer, biology, all of that stuff is what I lived in. And of course, those are in a science sciences, in my bones, in my psyche and my in my environment.

And I was a giant nerd myself from the beginning. And, you know, but I'm also a megalomaniac, which means that I'm always like thinking the biggest picture I could possibly think, right?

So I could have been tinkering away in a lab, working on one thing by myself, as many scientists and microbiologists do over most of their career. Or you could take that information, that knowledge, and trying to scale it in some way.

And so the microbiome became the the area for me in which I could scale the knowledge around microbiology and translate that into health and wellness and hopefully through work in developing products, doing research and all that impact lots and lots of people that way.

So that's, that's my drive and why I do what I do every day. And then, you know, being part of programs like this is really important because at the end of the day, we're empowering people with knowledge and information that they wouldn't otherwise have.

So this this kind of education also becomes a big part of what I do. I love it because, as you said, we're trying to, you know, make little people so little humans.

So let's jump into the first, most obvious question, which is what is the microbiome? And then the second obvious, how would that even relate to fertility?

Yeah.

What the microbiome is and why it matters

So the microbiome is defined as the totality of microbes and all the genetic elements as it relates to the host and

the host of course, being us humans, for those that aren't familiar, us humans, we harbor somewhere around 100 trillion microbes.

Right? We we have more microbial cells in our system than human cells. We have about 150 to 200 times more microbial DNA in our system than human DNA.

And in fact, our own DNA is wholly inadequate to function as anything, let alone this sophisticated species called a Homo sapiens. Right. We've got about 20 to 23000 functional genes.

And then you compare that to an earthworm that has 32,000 functional genes. Right? So we are not that sophisticated, but we do house all those one and a half, 2 million plus microbial genes in our system.

So you know, whether people understand it or not, at the end of the day, a lot of their functionality and capabilities, including having babies, comes down to what types of microbes they're harboring.

And the microbes are either going to be a help and be very supportive of fertility and reproduction and all of the things that are associated with fertility and reproduction, like hormone cycling and the health of the vaginal canal, the health of sperm and so on, or it's not only not going to be supportive, it's going to work against fertility and reproduction if you have the wrong microbes in high abundance, right?

So it becomes really important to understand the ecosystem that we carry and whether or not that ecosystem is supportive of reproduction. In fact, that and I'll tell you, I'll tap into this a little bit when we talk about the male side of infertility, which is a very important aspect of it.

It's in some estimates, 50% of infertility among couples comes from the male side of it. But on the male side, especially if your body thinks you're sick, it actually reduces your ability to reproduce.

Right. Because this is a natural selection phenomenon, because we don't want to reproduce ill fated children. Right. And those that are unwell shouldn't be reproducing.

So there are certain signals that that your body utilizes to understand whether or not you're ill or fit for reproduction. Right. And those signals can be triggered by dysfunctional bacteria.

So we'll we'll we'll dove into how that happens. Actually. I think you just got a lot of people's ears perked up is to think, wow, that could really relate to me because I think what a lot of people think of the microbiome, obviously, they're thinking the main microbiome, which is the mouth all the way through your intestines and then out the other end.

But you even mentioned in the statement you were just making even about like the vaginal microbiome or about even, you know, the male microbiome and the impact it would have on his testosterone and sperm production.

We have microbiome on our skin, which I've heard you talk about lots of times, and just knowing we have more than one type of microbiome and it plays such a role into our fertility and reproduction is mind blowing news, I think, for a lot of people.

I mean, just hard to wrap my head around it. And it's a field of interest that I just love. So keep going. I think I love like, wow. Yeah. Let's talk about how these crazy microbes can impact your ability to have babies.

Right? So where where's that coming from? What are the mechanics around it? You mentioned the vaginal microbiome. That's that's let's start there. That's a very important component. Right.

It's very clear that that that women who tend to have an elevation of infertility issues tend to also have severely disabled meiotic vaginal microbiota, which means that the ecosystem in the vaginal canal tends to be off more often than than on.

Vaginal microbiome and reproductive health

And when I say off and on, what I mean is having the right type of microbes versus the wrong type of microbes. The vaginal canal is a beautiful example of that because it's far less complicated than any other microbial ecosystem in the body.

In fact, in a healthy vaginal canal, most women should have just one bacteria predominating. The space. Right. Which is fascinating, because everywhere, almost everywhere else, the skin has a little bit more diversity than the vaginal canal does.

But areas like the gut, for example, or your brain in different areas, have hundreds upon hundreds of species. And you actually want more species. You want more diversity.

You'll hear me talk about diversity as we go through today, but that's related to the gut microbiome, the digestive microbiome. When it comes to the vaginal canal, most healthy women with a healthy vaginal canal should have one microbe predominating.

That whole area, if you tend to have higher diversity, you have four or five or six microbes. You have dysbiosis in the vagina canal and studies have shown that that dysbiosis not only does it make you more susceptible to things like bacterial vaginosis, yeast infections, UTIs, so those are listening.

Have experienced a lot of that in their infertility issue. That may be an issue of having this dysfunctional vaginal canal. Now, that dysfunctional canal is also heavily related to the ability to not only get pregnant but then sustain a pregnancy.

Women with a dysfunctional vaginal canal from a microbial perspective have a much higher rate of miscarriages and other dysfunctions that occur even during pregnancy.

Right? Because, of course, getting pregnant is only step one. Having a healthy pregnancy and sustaining it through duration and delivering a healthy baby is the other step to 24 and gets complicated.

So a healthy vaginal canal is important not only to get pregnant but also sustain pregnancy. Now we do a lot of things that that human as humans that disrupt the vaginal canal.

Right. Let's talk about what some of those things are. So, for example, if you're if you're trying to get pregnant, you want to make sure your vaginal canals healthy.

The vast majority of personal lubricants, which if you're trying to get pregnant, you're probably having sex. And if you're having sex, there's a chance you're using a personal lubricant.

Most personal lubricants destroying the vaginal canal. Right. So if you're buying those at the at at the stores and you're buying them online and they have heating functions and glow in the dark and whatever they might, you know, that is exactly right.

Slavery and. Right, right. All of those are really harming the vaginal microbiome. So it's reducing your ability to get and sustain pregnancy. Right. So instead of using that kind of lubricant, what I would use is I actually am not aware of any really, really safe lubricant out there because the company just haven't done the studies.

But there are ones that are cleaner lubes and the market being cleaner. I would lean towards those a little bit more, but better than that I would use organic extra virgin olive oil.

I do not use coconut oil. A lot of people talk about using coconut oil. Do not use it. Coconut oil is a strong anti-microbial. It will kill bacteria in the vaginal canal and potentially cause a problem.

I would use extra virgin olive oil if you have to use a lubricant. Right. So that's one thing that that that we do that

we're not even thinking about driving infertility issues.

The second thing is, if you're using tampons, tampons have been shown in certain studies to impact the vaginal microbiome in a significant way because of number one, especially if you're not using organic cotton tampons.

You've got cotton that has pesticides and herbicides on it. Right. Those are all strong antimicrobials so that you've got chemicals on those cotton based tampons that now you're exposing your very sensitive vaginal canal to and it's destroying the very sensitive lactobacilli that should be predominating in your vaginal canal.

Right. So that's one thing. The other thing is the tampons actually pull all the moisture from the mucosal layer of the vaginal canal, which is where the microbes need to exist.

And if you dry out those mucosal layers, it kills those microbes and it makes it easier for things like East and so on to to take hold. So using tampons in general is not a great thing if you're struggling through fertility right now or if you've had long term issues with the vaginal canal, if you're going to use a tampon, at least use an organic one, but you're probably better off using some other form of, you know, a pad or something like that, right?

I try to be limited in how much I speak about that because I don't have the experience of that. But but I do know the tampon thing is, is an issue detergent.

So if you're washing your underwear in this common harsh detergent with the residue that they leave on there, the microplastics and all the things that are present on on those in the detergents and end up on your clothing can also have a lot of impact on your vaginal canal.

And in fact, some of these, you know, you see these videos on these forever chemicals that are now added to the yoga pants, bottom of yoga pants and so on.

Right. If you're if you're exposing your vaginal canal to those things without underwear, especially if there isn't a barrier, those can also harm your vaginal canal.

I wouldn't sit in chlorine based hot tubs and pools too much. And you're trying to, you know, get pregnant because that chlorine sitting there for a long amount of time, the chlorine water can have a negative impact on your vaginal canal as well.

Right. So lots of things to think about. And that's maybe an area that you haven't even looked at as a as an area that may govern some of your fertility capabilities.

But the vaginal microbiome is a very, very important one to think about. Right? Then you go on to the gut microbiome. This is where it gets even more complex, right?

Because now one of the primary ways in which a dysfunctional gut microbiome can impact fertility is by causing something called leaky gut. Right. So your intestinal lining is supposed to be selectively permeable.

It's supposed to let nutrients through, but not let things like toxins and microbes and viruses and all through. Right. But when you but that that permeability is governed by beneficial bacteria in your digestive tract, if you have a dysfunctional type of bacteria, you typically will have some sort of digestive symptoms.

You may be you have IBS like symptoms, maybe a food sensitivities, maybe you get a lot of bloating or cramping when you eat. Maybe you get some immunological issues, right?

You have allergies and sensitivities. Maybe you get a skin rash when you eat food. So all of these things can be indicative of a GI issue going on. And those GI issues are going to be predominated by a dysfunctional microbial environment, which also means you probably have a leaky gut, right?

The majority of people we tested in a number of studies that we've done 55, 60% of what we call healthy young

individuals. These are individuals with no chronic disease, not on any medications out of normal body weight, average age 20 to 23.

So kind of prime of life, right? So 55, 60% of them have severe leaky gut and that's huge percent. Huge. Right. It was surprising to me because to me, they have no symptomology of it.

Right. They're not they seem to sleep well. And yes, they don't have the greatest lifestyle because a lot of these were college students. So we've been testing. Right.

But but they they're fine. They sleep well. They work out. They you know, they're doing some healthy things, lots of unhealthy things as well, but they don't have any impact from those unhealthy things.

Right. So when you see them and you look at them and you look at their BMI and you look at other parameters, you go, okay, they're probably really healthy in general.

They're resilient still. And then you look at their guts and their guts are severely leaky, right? Which means that every time they eat food, when you go to sleep, every time you eat food, you get a massive amount of inflammation like scorching through your body.

Right. And that inflammation largely comes from translocation of toxins that are present in the lining of your gut. And if that lining of the gut is compromise, in the case of leaky gut, when you eat food and all of that churning and volatility is going on with the process of digestion, a lot of those toxins leak through and you can measure them directly in the blood.

And those toxins being in your blood, in circulation, increase inflammation in a dramatic way to a point where your body actually thinks you're sick. So this goes back to that original point I made that if your body thinks you're sick, there are some counteracting things that it does to reduce your ability to reproduce.

Right. Because from a natural selection perspective, it's all about ecological fitness. And ecological fitness is the healthiest with the best genes move forward, right?

Yeah. Those disrupted genes and who are unhealthy inherently don't get to move forward. Those aren't the genes we want to concentrate in the population.

And so your body has some counteracting things. So let's, let's start with men and talk about them. Yeah. Men are in a scary situation I think. Right.

If you look at there's been a number of studies on this topic that was a meta analysis study, which means that it looked at, I think, 200 plus studies on this topic since 1973.

There's one study of the other has been following male sperm counts since 1973. We know that in the last 40 years, the average sperm count has dropped 50% or 50%.

Gut health, leaky gut, and hormone disruption

Right. That's an amazing amount. And the crazy thing and that was they were measuring till 2011 and since then they've been measuring as well. And it's dropping at a rate of around 1% per year, which means that the average sperm count in in another 50 years is going to be zero.

Right. That means half the men will have above zero, slightly above zero, and then the other half will have zero. Or I don't know how you can have negative sperm counts, but the average is going to be zero, which is crazy.

Yeah, right. And you know, we were just talking about off air, but you've seen that in battle. Yeah, right. Which is which is absolutely amazing. Now, sperm counts and the quality of the sperm have dropped dramatically, which means that the ability of the male to impregnate the female is is significantly reduced.

Right. Because when it comes to the male side of things, we really have two things that we contribute. One is the quality of our sperm. So how well do they swim?

Because they've got a long journey, right. To get to from where? Their release to the egg. Right. They've got a long ways to go. So what percentage of your sperm have high fitness and high capabilities?

Right. That's number one. Number two is the volume and this count because it's a numbers game, right? Every time you ejaculate and if you're trying to get your partner pregnant, you're putting up trillions of sperm.

Right. With the hope that one makes it there. And that's a numbers game we're trying to play now. Instead of a trillion, you've got 500 billion. That's going to reduce the statistics quite a bit.

Then you go to 500 million, then you go to 50,000. You keep reducing chance of one of those sperm getting there and actually penetrating through. And and, you know, fertilizing the egg becomes minuscule.

Right. So then the question is, okay, why is our sperm counts dropping so significantly? Well, there's a number of explanations, right? It's not just one thing.

A big thing is our environment. Of course, we are exposed to all of these. You know, hormone disruptors and so on in our in our ecosystems, very microplastics.

We know phthalates, for example, in plastics, we know those have an impact on sperm count. We know, you know, herbicides and pesticides can have an impact on sperm counts.

But one big thing is this issue of leaky gut. And the reason is right, when when you see an increase in toxins leaking through into circulation from men, there's something called a gelding principle that shows that when you have an elevation of endotoxin, you get a reduction of sperm production and you get a reduction first, you get a reduction of testosterone.

Then as a result, you get a reduction in sperm production. Right now, why do you get a reduction in testosterone? And when we can say that actually testosterone levels have dropped significantly in the double digits over the last couple of decades as well.

So if you look at the average testosterone levels in men, you're now seeing men in their late twenties at normally have 40 plus year old testosterone levels.

Right. So that's also dropping quite a bit. And so sperm counts drop in accordance with that potential reduction in testosterone. So why is it that that testosterone will go down if your gut is leaky?

Well, as I mentioned earlier, when you've got a leaky, toxins leak through, inflammation goes way up, your body has this has a system where if your inflammation is high, it actually negates the production of testosterone from the testes.

So you've got a glass in your brain called the pituitary gland. Pituitary gland is a plane that normally sends signals to the testes to produce testosterone.

But the pituitary gland is also observing things like inflammation and stress and so on. And if there's elevation and inflammation, it fails to send a signal to the testes because it doesn't want you to be sexually active.

A sick male is supposed to be sleeping in the cave. Absolute generally, and trying to get better. Running around with an erection, trying to impregnate people.

Right? Yeah. And this is natural selection for fitness. So if your body thinks you're sick, it's going to shut down the production of testosterone, which is the thing that gives you that virility and energy to go out and hunt and gather and fight and defend and all that stuff, and then also give you the ability to gain erections and be sexually active

and do all the things that humans are supposed to do.

But if you're sick, you're supposed to lay down and try to recover, right? So your body shuts those components down, right? So in the case of men, that elevation in inflammation has a direct impact in reducing testosterone production, which then has a direct impact in reducing sperm counts that then has an impact on male fertility, right?

Yeah. So that's that's one way in which leaky gut and the resulting dysfunctional microbiome that drives leaky gut can impact fertility. Now, on the women's side, it does something similar in women.

It also elevates inflammation. And chronic inflammation from leaky gut has been shown to disrupt hormone cycling quite significantly. Right. So you've got periods that are all over the place.

You've got, you know, issues like estrogen dominance and you've got all kinds of other complications around hormonal cycling that that, you know, I'm sure other people in Summit would talk about, but hormone cycling is a really important part of fertility, right?

There's got to be a natural component to that. And so hormone disruption occurs due to leaky gut. Now, the other thing that gets disrupted is the inflammation from leaky gut has been shown to directly impact the ovaries themselves.

Right. And it can cause things like polycystic ovarian issues. You can get cyst formations, you can get inflammatory damage to the eggs. You can get issues with releasing the eggs appropriately.

Right. You can get issues with the eggs traveling appropriately down the fallopian tubes. Inflammation can inhibit all of those functions. Allergies, that same inflammation has also been shown to reduce the the the probability of the implantation of the egg in the lining of the of the womb.

Right. So that is another huge issue that women tend to suffer from. And then, of course, that inflammation also will lead to inflammation in the vaginal canal, which can disrupt the vaginal microbiome as well.

So. Oh, and then here's one of the craziest aspects of this. Pregnant women who are already pregnant and let's say they're carrying a female fetus. Right?

So a baby that has female reproductive organs, if mom it has leaky gut, that endotoxin exposure to the baby, to the infant can create disruptions in the development of her reproductive organs in utero.

So studies have shown that this leaky gut that comes from a microbiome disruption can create what they call transgenerational fertility issues, where it's mom's messed up gut bacteria is now creating a fertility infertility issue in the fetus that isn't even born yet.

Right. And when they are eventually born and they get to reproductive age, the damage that occurred in utero impacts their ability to have babies at reproductive age.

Right. Why don't you think about that? Yeah. And is studies on this trans generational of fertility impacts from leaky gut. So at the end of the day, right the message is really you have to be cognizant of the ecosystem in which you're trying to have a baby and build a new human.

The microbes will play a significant role in your ability to get pregnant and your ability to sustain the pregnancy and then how healthy the developing fetus is during the gestational process and then how healthy the birth process is as well. Right.

So just another example of that, the tie between microbes and the health of the fetus. So arguably one of the most important things we want to happen to a healthy fetus in the womb is to develop the brain appropriately.

Right. The brain, the central nervous system controls so many things in the body. We want the baby to have full

development of the brain and all of the regions of the brain.

Right. We've outsourced a lot of that development of the brain to microbes in the mom's gut. And the mom doesn't have enough of these beneficial microbes in her gut.

Male fertility, testosterone, and sperm decline

There is a risk that the baby will will will be delivered with an underdeveloped brain. And this is actually part of the reasoning around the increase in babies being born with attention deficit disorder, mood disorders, spectrum disorders.

In the case of autism and so on. Right. There's a developmental, developmental issue that's occurring in utero itself. Now, there was some big studies that showed that the biggest risk for for neurological development disorders in babies comes from moms who are who have a lot of gestational stress and gestational obesity.

Right. High gestational stress. High gestational obesity increases the risk of delivering a baby that has central nervous system or brain development issues.

Then the mechanism wasn't quite understood. So one of the mechanisms that has been elucidated now is that those moms that have high levels of stress and high obesity tend to have dysfunctional microbiomes, which is part of why they're so stressed, part of why they have issue with weight.

And then because they don't have enough of a beneficial bacteria. These are certain types of bacteria that contain a carbohydrate called peptidoglycan.

If mom has enough of these bacteria, what tends to happen is mom's immune cells reaches across the lining of a gut, grabs these bacteria, takes it across the lining of the gut, takes it to the placenta and releases those bacterial carbohydrates to the placenta.

The placenta has binding proteins for those carbohydrates that bind them, bring them across the placenta, and then carrier proteins. Take those bacterial carbohydrates to the baby's brain, where the baby's brain has receptors for those carbohydrates.

They bind it. And that triggers the development of the different parts of the brain. That triggers the development of the blood brain barrier, the synaptic genesis, the formation of all the different neurons, the the myelination of the central nervous system that's putting the insulin insulation, if you will, on the central nervous system.

All these really important things are triggered in part by this bacterial byproduct that the baby's supposed to get exposed to from mom's gut. But if Mom inherit has a dysfunctional gut, she's not going to have enough of those microbes in order to pass on to the baby.

So if you're listening to this, you're thinking about getting pregnant, sustaining a pregnancy, but you have to think about the next step is, are you giving your baby the best shot at full development, appropriate development through the course of gestation and then through delivery as well?

And in all of those steps, a healthy microbiome becomes a key component as well. A massive component. And I know a lot of people listening right now are probably thinking, oh, no, I have IBS like symptoms.

I absolutely get gas or bloating. I have multiple food sensitivities, I have constipation, diarrhea, or alternatively not even vaginal, chronic vaginal issues.

You know, yeast infections be the infections every time you have sex, urinary tract infections, etc.. And so I think this has been really eye opening and mindblowing to a lot of people, not just the women, but to the men who are listening as well.

So obviously, the next question is, what do we do, Karen? Save us. What can we do? So okay, so you have to you have to think about your system really as an ecosystem.

So there's a lot of variables that impact your ecosystem and we can break it down to a few, a handful of things that you should be really cognizant about doing and not doing that will continue to support your ecosystem.

Right. And not only through the process of trying to get get pregnant, but then also through pregnancy and through birth delivery. And so first thing for people to think about is what not to expose your system to, right?

So we have a whole host of things that are antimicrobial, that harm the ecosystem on your skin, in your gut, in your vaginal canal and all that. We talk about the vaginal strategy, right?

So the cotton tampons and the lubricants and all that. So keep those in mind and utilize that those set of strategies for the vaginal microbiome. So the gut microbiome, what you want to do is start dramatically reducing your consumption of processed foods right?

All of these processed foods with the additives that they contain, the the growth inhibitors from microbes, the preservatives. Right. The antimicrobials, the coloring, the flavoring, all of those things have never been tested on the human microbiome.

It doesn't require testing them for the human microbiome to approve them for sale in the public space. Right. So our system of proving that a food is safe is archaic.

Pregnancy, fetal development, and transgenerational effects

It's based on stuff from the fifties and sixties, right before we knew that this microbiome even existed and the system of testing whether something is safe has not evolved around the our updated understanding of biology.

So we now know and we start to see this, we start to see that, oh my God. Okay. Where people have been using sucralose and it's better than it's sugar, right?

Because it's not sugar. So Diet Coke has got to be better than regular Coke. Well, no, you know, in fact, Coke in general is not good for you. But if you're going to drink one, you're better off renting the regular coke because the sucralose, the artificial sugar is actually way worse for you.

Right. Than than diet than the real sugar is it actually has all of the negative impact of real sugar and then some more, right? So all of these things that additives, that food science, that whole world of food science tries to come up with to enhance flavor and improve color and make things never expire and can sit in a plastic container for ten years on the shelf.

All of those things are bad for your microbiome, right? So the more you can stay away from heavily packaged and processed foods, the better and you know, most people know that already and they just don't think about it.

Think of it in a really cognizant context of their existing health problem. Right. But if your existing health issue is fertility and that's why you're watching this program, know that eating those processed foods is having a huge negative impact on your ability to have a child.

Right. So a true dismantling your microbiome. So go as much as you can to clean normal food. Right. You don't have to have some crazy diet. You don't have to be carnivore or vegan or paleo, any of this crazy stuff.

We are omnivores as a species. We eat a huge variety of things to try to get a variety of food into your system, but just eat real food, right? Yeah. That's that's the best way to think about diet is like eating actual perishable real food.

Don't worry about all the macromolecular balancing and all that stuff, right? All that stuff is like for the biohackers of

the world. I want to get obsessed with it, right?

So just eat real food. That's the first thing. And then the second thing is diversifying your food as much as you can, eating a good variety of foods that you can.

I know when when women are pregnant, you start to narrow what you can eat because now you no longer eat most fish. And there's lots of things that you're concerned about eating fine.

But within the categories of foods that you can eat and eat comfortably, try to expand the diversity as much as you can, right? So that's one one category of things.

Food, clean that up, try to get real food in. The second part of it is your engagement and relationship with the outdoors. This actually makes a significant difference how much time you actually spend in natural environments outdoors.

And I don't mean just sitting on your porch, that's still better than not doing it right. But I'm talking about going for a walk in a natural environment right near me.

There's all these forest reserves, beautiful trails, bike rides, walks. You can do if you're in the coast, going to the beach, getting your feet in the sand, just engaging with nature as much as you can.

Right. That has a huge impact on the diversity of your gut microbiome, which can work against the leaky gut. The other thing is cleaning up your personal care products in your home environment.

When I say cleaning it up, I don't mean sterilizing it. Actually, exactly the opposite. Right. So you don't need to clean most surfaces in your home with any sort of antimicrobial, sterile cleaner, right?

99% of the surfaces in my home are basically clean with just water and a couple of drops of essential oil. So some smell and you just wipe it down. Right?

But if you bring a raw chicken, you get chicken juice on your counter. Absolutely. Sterilize it. You want to sterilize your toilet to do that, if you want to clean your showerhead of the mold, do that.

That's fine. But most surfaces shouldn't be sterile as much as you can have the doors and windows open. So you let microbes into your system in your household.

The other aspect of it is your personal care products, right? So go through and start thinking about cleaning up some of the personal care products. Start with aluminum free deodorant, right.

And then try to go a different that has the fewest number of ingredients as cleaners go to a lotion that has the fewest number of ingredients that are clean, just some basic shea butter or something like that.

Right. You just think about all those personal care products. And the reason is all those things will get absorbed into your system one way or the other, even though you're putting it on the outside, it does go through the barrier of your skin.

It can get absorbed into circulation and it does impact your overall microbiome. Right. So that now stress management is another tip. Stress is one of the biggest drivers of dysbiosis, which is the imbalance in your microbiome.

And stress is one of the biggest drivers of leaky gut and stress induced. Leaky gut is the number one killer worldwide, according to the team publication in the Frontiers of Immunology. Right.

This is a meta analysis, meaning study that looked at lots of different studies, stress induced leaky gut drives, more death worldwide than anything else.

That's huge. It's huge, right. It's a foundation of chronic illness. It's it's the number one cause of chronic low grade inflammation. Inflammation is all the things we talked about earlier that drives infertility in men and women and so on.

Right. So you need to manage stress now. There's a few different ways of doing that. Number one is, of course, there's lots of mindfulness work you can do, download the apps, do meditation, you know, try to get some yoga and whatever helps you balance all of that.

But note that your diet also impacts your stress, right? And there are psycho biotics. Now these so probiotics are probiotic bacteria that impact your mood in a very dramatic way.

Look up psycho biotics like Zenbiome, for example.

Practical steps to support microbiome health

They can have a huge impact on your overall mood and manage inflammation associated with stress, right? So stress is one of the biggest things. Keep really, really clean mind and clarity on talk around stress.

You cannot minimize its impact on your overall health and your ability to sustain a pregnancy. And the final thing is, you know, getting adequate amounts of prebiotics and fiber into the diet.

I shoot for 25 to 30 grams of fiber a day in my diet, which is to me a kind of a base amount for a healthy microbiome. And then prebiotics which are normally different than fiber.

So fiber are like these more or, you know, general insoluble or soluble roughage that goes through your system. Prebiotics tend to be things like oligosaccharides, like Inulin.

Some people I've heard of that specifically feed certain classes of bacteria, right? So you want to Google and look for good prebiotics of foods that are rich in prebiotics and then also foods that are rich in fiber and then try to increase the intake of that into your diet.

And lastly, a good probiotic can certainly help. We worked a lot with the spore based probiotics that can reduce leaky gut dramatically. That's at least at a at a base level.

You should be taking a good probiotic on a daily basis. Right. So if you add all those things up, including all the things on the vagisil side of it, to improve the vaginal canal, you're really transforming your ecosystem and making your ecology much more suitable for reproduction.

And then of course, delivery of a healthy baby. Which is the goal. And what I so appreciate about in talking to you is that it's all very practical and tactical.

It doesn't break the bank. It's not set for the very elite, you know, higher folks. Anyone can do it can make these changes today. They could write them down on a list, search some of these things and be off on their way for super wonderful outcomes when it comes to their fertility.

So this is fantastic. And it's really the culmination of all of those things. And each one of the things I describe is kind of a little step in the right direction.

It's the additive effect of all of those things that really will revamp your ecosystem and you keep that up through. Once you get pregnant, you keep that up so gestation so that you have the healthiest system to to, you know, build this human.

And then you keep that up through post delivery as well, because your system is going to go through a jarring thing, you know, as soon as you deliver.

Right. I, I can't even fathom the things that women go through delivering this baby. And, you know, like Jolene talks about, like, you know, that that that post.

The fourth trimester. Yeah, trimester, the postpartum first trimester is just a very complex situation for a lot of women. And having that kind of resilient, diverse microbiome will really help you get through that.

Right? So so keep that up and then of course, embed some of those practices on your child because their microbiome early on is going to, in many parts, dictate their future health outcomes as well.

And your microbiome that you impart to the child, because the child is largely getting their microbiome from you, from mom and then close interaction with dad as well early on.

Where to find Kiran Krishnan

And once they're born, you're imparting a very healthy microbiome, hopefully to a child which will help them will address your lives, or you can impart an unhealthy microbiome which will impact them in a negative way for the rest of their life.

Right. Right. Well, this has been absolutely fascinating. So for everyone listening, where can they find you? Where can they learn more? Yeah. So you know, I try to put out as much of this information as they can.

If you're on Instagram, follow me @kiranbiome. That's K I R A N B I O M E, on Facebook. I think it's just Kiran Krishnan. If you look that up, I think you'll find me and a lot of my stuff and, you know, reach out to me in those settings.

I try to engage with people as much as I can to provide them some direction on things to look into and talk to the practitioners about. But yeah, I'm always happy to do that as much as I can.

Well, thank you. You are always a wealth of information. I always, always, always learn so much for you. Thank you so much for being on the Summit today.

It is my pleasure. Thank you for having me.