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Dr. Emeran Mayer: Our Microbiome is not a stable system. It's adapting most of the influences it gets from the brain constantly. It also adapts rapidly from influences it gets from our diet."

Mary Purdy:

Welcome to The Good Clean Nutrition Podcast. I'm your host, Mary Purdy, Integrative Dietician and Nutrition Educator. Before we get into today's interview, we want to remind you that this podcast is now also available to watch on YouTube. Simply visit youtube.com/drinkorgain, or click on the link in this episode's description to watch this and past interviews.

The human gut microbiome, this is the community of trillions of microorganisms and their genes that live in our intestinal tracts and play numerous roles in keeping us healthy, from supporting metabolism and nutritional status to influencing our immune and brain function and so much more. This is still a fascinating area of emerging research, and while it isn't clear exactly what the optimal makeup of bacteria is for everybody, one thing that we do know is that diversity in this internal ecosystem is really key.

And a few years back I was working with an organization where we were testing the diversity levels of our clients' microbiomes. We were looking at things from a very, very high level, like a broad level. I'm looking at families or phylas of microbes as opposed to specific species. And I was working with someone who is experiencing constipation, high cholesterol, metabolically unhealthy, extra weight, elevated inflammatory markers. And when her microbiome tests came back, we saw that her diversity levels were quite low and she also had a high amount of a certain family of bacteria that has been linked to numerous health conditions and issues.

So we got her really revising her diet, getting in more fiber and variety of different fruits and vegetables, herbs and spices, prebiotics, probiotics. And we did another test on her and I was able to see this connection between her diet and her lifestyle and a shift and an improvement in her microbiome diversity and to understand the connection between diversity and improved health because her inflammatory levels went down, her cholesterol went down, she had more energy, she lost some of that metabolically unhealthy weight and it was amazing, and her digestion actually cleared up as well.

So there is so much obviously to this complex system. So I'm really excited to be able to speak to an expert today on this very, very complex and nuanced topic to understand the mechanisms behind these changes. Today we are joined by one of the foremost experts on the gut-brain immune connection, Dr. Emeran Mayer. Dr. Mayer is an award-winning Gastroenterologist and Neuroscientist and is considered a pioneer and world leader in the areas of gut-brain axis interactions, chronic visceral pain and functional gastrointestinal disorders. He's published over 400 scientific papers and is the author of the books, the Mind Gut Connection, and the Gut Immune Connection. Welcome, Dr. Mayer.



Dr. Emeran Mayer.:

Thanks Mary for having me on the show, and thanks for the kind words and the really comprehensive introduction. You've basically talked about everything that there is to say about the importance of the microbiome with health.

Mary Purdy:

I'm pretty sure there's a heck of a lot more and we're going to dive deep into it. So let's actually start. When I think of western medicine, people often think of the gut as being the hub of digestion and absorption, but we know now that when we think of gut health, we got to think about the microbiome and the influence it has in all these different systems in our body. So what led you as a gastroenterologist to go from looking at gut health and just how that relates to digestion, to linking it to brain health and neuroscience and eventually immune health?

Dr. Emeran Mayer.:

As you know, I've had a career long interest in brain gut interactions from day one, even from the start of medical school. It's been an amazing journey, I have to say, in the last 12 years. It was exciting in the beginning, just the brain gut interaction, which is fascinating by itself. But to add these other dimensions to it clearly has created this holistic understanding of this one health concept that it's not just a body, a brain, our mind, the gut, the microbes, the soil, and the planet. So it's been an interesting ride to say the least.

Mary Purdy:

Well, I love that you're getting into how we grow our food piece and the one health piece, I'm going to put that on pause for a second because I definitely want to ask you about more of that. I want to make sure that we understand the actual connection and how the microbiome affects brain health. And you mentioned a bidirectional relationship. So talk a little bit about how does the gut microbiome actually affect brain health, and then how does the brain communicate to the gut microbiome and what does this mean for mental health issues and cognitive function?

Dr. Emeran Mayer.:

The mistake is generally made of assuming or basing conclusions and assessment of findings on a linear model that one microbe produces one metabolite, then this metabolite affects the brain, and nobody talks about the opposite direction of communication, which we have known for a long time, even earlier than these exciting microbiome studies that stress and emotions both in animals and in humans can affect microbial composition and function and even affect microbial behavior and gene expression directly. So you have to look at these things together. That's why I talk about a system, not an axis, [inaudible 00:05:51] a microbiome system because often we don't know where it starts, the process. Is it that a lot of people in mental health, for example, have genetic predispositions at the brain level and early life experiences, most extensive literatures and all of these things on this top-down modulation, do



these mental disorders start in the brain and then send these abnormal signals to the gut and it's microbes, and then the microbes change their behavior and their function and what they produce and how they interact with cells in the gut.

And that feeds back to the brain either reinforcing it or making it more severe, the syndrome. But I'm absolutely convinced that at the end of the story, science and clinical applications will have developed and will be based on the model of these circular interactions, and that has implications for treatment. If this were just a linear connection, that one dietary component can cause depression or Alzheimer's or would actually be relatively easy to solve, you just eliminate this one component, but it's not that easy. We're dealing with thousands of molecules, trillions of microbes that interact with each other and with the host, and everything is built in feedback loops. If something happens in one side, it affects the other. So a very complicated scientific story. In some ways, an easy application at the moment, which doesn't require all the science, that lifestyle, particularly diet, has a tremendous effect on the health of the microbes, the gut health and the brain and metabolism. So that the dietary recommendation is the easy answer what we need to do.

Mary Purdy:

So what I'm hearing from you is there's this interesting relationship between the gut and the brain. The gut microbes are creating what you said metabolites, whether that's short chain fatty acids or they're helping with the production of those neurotransmitters and sending that up to the brain, and then the brain also may have, whether it's because of stress or emotions as you mentioned, that may also be affecting what the gut microbes are producing or how they're operating, and that creates this loop that either gets stuck in a pattern of creating mood issues or mental health issues or actually resolves those issues or improves upon those issues is, am I getting that right?

Dr. Emeran Mayer.:

Yeah. No, this is absolutely right and I just want to come back to this, how powerful the influence of the brain on this system is. So outflow from the brain in form of the autonomic nervous system modulates every gut function. So every motion that goes on in our brain, every stress has a mirror image. So not just a mirror image in our facial expression, you can tell if somebody's depressed or anxious, but it has the same mirror image in the gut that we don't see in either. Even with an endoscope, we don't see it, but that has a major influence on the microbial habitat. So regional transit rates, how fast moves through one part of the gut, for example, through the small intestine, has a major impact on the community structure. Our microbiome is not a stable system. It's adapting both to the influences it gets from the brain constantly. It also adapts rapidly to influences it gets from our diet. It's one of the hallmarks of these microbial organisms that they're much more adaptable to environmental changes both that happen inside the body, but also they're coming from outside than our human genes, our genes are first of all, we only have 20,000 as opposed to the millions that the microbes have. And secondly, it takes thousands of years before the genes actually change in adaptation to perturbations.



So one of the biggest benefits of these microbes is it's a rapid response system that adapts us much better to the environment and to what goes on within the brain than our own immune system does, or the microbes in response to a change in diet can change within 24 hours and can switch back to the original way of functioning and composition. And it's the same thing, if you're stressed, they change, but they don't stay like this forever. If you then do relaxation exercise, it switches back to its original function. So a big advantage of microbes in the evolution of humans and the adaptation to always changing environment is that they're the ones that actually can change rapidly and adapt us rapidly.

Mary Purdy:

So the microbes in our gut are constantly changing, interacting with our immune cells, with our messages that we are giving them because of our stress, our emotions, our diet, as you mentioned, which we'll get into shortly. It really is a constantly evolving and changing ecosystem that is determined by every single thing that we are doing or interacting with on a regular basis.

Dr. Emeran Mayer.:

Absolutely, it's this multifactorial modulation of that system. It's another systems' biology concept. There's multiple influences like lifestyle factors and diet and chemicals and that all have an influence. And the ecosystem in some ways has a certain amount of resilience. It doesn't collapse most fortunately, almost never, unless you have a devastating disease.

Mary Purdy:

It's amazing to think that you can shift the ecosystem in your gut by food choices. That's an empowering piece of information right there, and I want to get to something that you wrote in your book, the Gut Immune Connection. You write about how alterations in the gut microbiome can be tied back to some of the most common non-communicable diseases that we are seeing in our nations these days, heart disease, diabetes, Alzheimer's, Parkinson's and even cancer. So talk a little bit about how do we find this altering... What is it that is altering the gut microbiome and how do we begin to resolve that with dietary factors?

Dr. Emeran Mayer.:

Well, certainly at the beginning of this stance, the unhealthy diet, what's called the standard American diet or the SAD or western diet, and it's pretty extreme. If you compare it to other countries around the world, the ones that have adapted to American lifestyle, they have a similar one. But otherwise, this has never really existed in human evolution. It's ultra processed food and massive amounts of sugar and chemicals added to it, lack of plant-based fiber. So that diet stands at the beginning of this story because what it will lead to in the gut is a microbiome that's deficient in these microbial strains and species that produce anti-inflammatory molecules like butyrate, the short-chain fatty acids. And that decrease in this anti-inflammatory tone you might call it, is then the secondary consequences that at least the low grade inflammation in the gut in combination with a compromised barrier that isolates the microbes, even the healthy microbes in the gut from our immune system.



If that protection is compromised, then microbes have access to different types of immune cells that then ring the alarm bells even inside the gut. So these dendritic cells have sensors that stick into the gut lumen. If the microbes get too close to them, it will trigger the alarm bells and it will then start a cascade of inflammatory molecules throughout the gut-based immune system. 80% of our immune system is located in the gut microns away from the microbes. Then if at the same time you have a deficiency of these anti-inflammatory molecules, obviously you have a runaway immune activation that doesn't stay in the gut, but it spreads adipose tissue to fat tissue and pretty much every other cells. But an interesting aspect is how it changes our fat tissue by some of these warnings. Immune cells, these dendritic cells, when they migrate to the liver, they change the liver into an inflammatory organ.

So you have the gut as an inflammatory inflammation generator and then the liver and from there it spreads virtually to all other organ systems including the brain, the heart, kidneys. So when I got into this deeper, as a scientist, you always reluctant to have a unifying theory for everything, that explains everything, that normally is not the case because nature is more complicated. But in this case, I think it's very tempting to say that there is a unifying process which is low grade systemic immune activation throughout the body and based on your genetic vulnerabilities and other factors, you then are much more prone to develop one of these chronic non-communicable diseases. If you have the genes predispose for heart disease or for non-alcoholic fatty liver disease or Alzheimer's, then this phenomenon, this low grade inflammation will greatly increase your risk to develop this disease when you are older.

So we talked about earlier if these changes... So you can induce and this low grade inflammation in your gut acutely by ultra marathon runners for example, it's been shown that extreme exercise does something similar. It increases the gut permeability, causes these inflammatory processes, but as we said earlier, that's an acute stimulus. If that runner then takes rest for the next two or three or four weeks, everything settles back to normal. But that's not the case in our society that most people live with that condition throughout their lives from early childhood on, and we see the consequences of increasing rates of these diseases and a lowering of the age when these diseases start. So it's a constant decrease in the age. I mean, childhood obesity, childhood type two diabetes, childhood inflammatory bowel disease, all these age ranges have moved downward because the dietary insult happens and other lifestyle factor insult happens throughout the life, affects the mothers, the pregnant mothers that hand it over to the offspring.

Mary Purdy:

Yeah, it starts very, very early, doesn't it, even with epigenetic changes on the maternal side. And it sounds like there are these alterations that happen within the gut microbiome because of diet, ultra processed foods or the SAD, that standard American diet, lifestyle habits that shift, the ratio of the good bacteria that are producing these anti-inflammatory metabolites, reduces those and increases the ones that are producing these inflammatory metabolites or molecules that are then having an impact on all our different organ systems from our heart to our liver to our brain and increasing inflammation or



putting on the alarm system of the immune function to perhaps go into an autoimmune condition and create some of these chronic diseases that we are seeing in our midst, in our practices.

What about infectious diseases? When we're thinking about immunity and compromised immunity, since you mentioned about 80% of our immune function is within our gut. If our gut is altered or if our gut microbiome is altered, does this also predispose us to infectious diseases, let's say like the flu or even Covid-19?

Dr. Emeran Mayer.:

There are some interesting studies about Covid-19 in terms of the risk factors particularly to develop more severe forms and rate of hospitalizations and long-Covid. And those studies have shown a link between an unhealthy diet and a compromised gut microbial ecosystem with fewer short chain fatty acid producers. Covid-19 does not affect the gut directly in any significant degree, but since the majority of our immune cells either live in the gut or have traveled through the gut in their lifetime, they are affected by what goes on in these interactions between microbes and the immune system. If you look at Covid-19, the people that were at the highest rate of the complications and the long-Covid are also generally in a lower socioeconomic level of our society where these diseases, these non-communicable diseases are more common.

So it all points in that direction that it not only predisposes people with a poor diet for these degenerative and metabolic diseases, but also for the infectious diseases. And it's also interesting, people always think about or talk about there's a need to boost the immune system in Covid-19. That's really not the case. The main damage happens from an overactive immune system or what's called a cytokine storm that is more cytokines being produced. So it's reestablishing the balance and increasing these anti-inflammatory mechanisms. It's almost like we carry our own factory for aspirin and non-steroidal anti-inflammatory drugs in our body. With the help of the microbes, we constantly produce those substances. If the supply chain, what this production of these molecules is altered because of our diet, then obviously we have a big problem. Ultimately what's more important?

Mary Purdy:

Maybe it's a combination of both. I mean-

Dr. Emeran Mayer.:

It's very a combination, yeah.

Mary Purdy:

I never believe that anything is happening in isolation. I believe it's a confluence of different factors that are all coming together to create that perfect storm. And yeah, I hear you loud and clear on the not wanting to boost the immune system because the last thing we want to do is engage the immune system and higher activation that may increase inflammation in the body when it comes to something like the



cytokine storms that happen with things like Covid-19. So it'll be great to get some more active instruction around how to manage and modify diet and lifestyle to improve that inflammatory response.

I'm Mary Purdy and you're listening to the Good Clean Nutrition Podcast. We're on with award-winning gastroenterologist and neuroscientist Dr. Emeran Mayer, discussing the gut-brain immune connection. Next, we'll dive into strategies and practical advice to optimize your gut health and help prevent disease. But first, a word from the sponsor of this podcast, Orgain.

Speaker 3:

Thanks, Mary. Probiotics play an important role in your body's mind by connection. For a simple way to add more probiotics into your diet try Orgain Superfoods Powder with 50 organic superfoods and 1 billion probiotics in every serving. Simply stir the powder into your favorite juice, sprinkle the top your morning oats or blend it into your morning smoothie. Learn more at orgain.com. Now back to you, Mary.

Mary Purdy:

Now let's get back to our conversation with Dr. Mayer.

Okay, so Dr. Mayer, we know it is absolutely key for our health, our immune function, our brain function to you have a balanced gut microbiome? The question is now how do we do that? How do we change the dysbiosis or the poorer ratio of good to bacteria into a more balanced ratio with diet or supplements or lifestyle habits? What are some first steps you can take us through?

Dr. Emeran Mayer.:

Yeah, so let me first go through what has been discussed and what is being promoted. So several lifestyle changes anywhere from regular mindfulness based stress reduction, relaxation techniques which decrease that influence of the sympathetic nervous system on the gut and the microbes that we talked about earlier. It's also a regular but moderate amount of exercise. If you do it too extreme, you have the opposite effect. You contribute to this inflammatory state. Then in general, there's lots of association and epidemiological studies about the diet. In terms of diet, so the simple answer is a largely plant-based diet is definitely the best way to nurture and optimize your gut microbiome. The main source of these complex carbohydrates that make up fibers, microbial accessible molecules that we eat, the molecules are too large to be absorbed in a small intestine, so they go to the distal small intestine where the microbes are in greater number and particularly into the large intestine. These microbes there break it down and that's the main source of nutrition, and they generate smaller molecules that are then absorbable that act locally on the gut in an anti-inflammatory way or in a strengthening way for gut health.

But they also are absorbed into the systemic circulation and throughout the body of anti-inflammatory effects. Other group of molecules in a plant-based diet are the polyphenols that got a lot of attention a decade ago as there was this craze about antioxidants and the need for the beneficial of antioxidants. In the meantime, we know that yes, most of these molecules in the test tube work as antioxidants in



artificial test tube situations, but when they're ingested in our GI tract, there's minimal levels in the blood that are detectable for the same reason as the fiber because they cannot be absorbed, they're too large, the molecules, they go down, they have to be pre-processed by the microbes and then have a beneficial effect both on the microbial health, ecosystem health, but also on pretty much all our organ systems. We have two main arguments why they are beneficial for both the microbes and for our overall health. And that also supports that other concept that all these chronic diseases probably share some element of these endothelial abnormalities, these inflammatory, or that's why we see them all linked to the standard American diet. And that's why this growing evidence that these dietary interventions with a larger plant-based diet have beneficial effects.

Mary Purdy:

Yeah, amazing. And so I'm hearing lifestyle factors like stress reduction, mindfulness based stress reduction being key, plant-based diet, including things like fiber and polyphenols from a variety of different brightly colored fruits and vegetables because those polyphenols are actually being transformed by the microbes in our gut to create these metabolites that we can then use that perhaps act as nitric oxide or vasodilators for our blood vessels, which help with our brain function and our heart function and who knows what other functions in our bodies. Sometimes these things are impossible for everybody. You mentioned upfront, people from lower socioeconomic backgrounds, they may have higher stress levels for whatever reason. They may have less access to some of these foods that we're talking about.

So we're seeing a real disparity between people who have access to these foods that help their guts, microbiomes and ultimately their health. And then there's the issue of how our food is grown. You mentioned this upfront, and I know you've done some interesting both research and conversations around the health of the soil and the chemicals that come into our food supply. Talk a little bit about how the soil microbiome and the chemicalized food supply that we currently have impacts or plays a role in our gut microbiomes health.

Dr. Emeran Mayer.:

Yeah, this is a fascinating story that I never thought when I went into medicine that I would ever get to that point. Even though looking back at my childhood, I did spend some summers on the farm of my relatives. So I was exposed to the whole farming life and at that time it was like the optimal upbringing because you were constantly immersed in soil, digging out things with your hands out of the soil with the farm animals and total exposure that probably boosted my microbiome health from the beginning. So one of the most interesting stories is that plants, they have leaves and have fruits and have a root system, and typically as consumers remain interested in what can be seen what the plant produces. But what's going on in the root system of these plants and their interactions with the soil microbes is really a remarkable story that if a plant is under stress, we could compare it to human stress.

So it's UV light, infestations, chemicals, any kind of diseases or pests that the plant is exposed to will generate the signal that the plant produces that goes down into the root system. That system stimulates



the roots to secrete this sugar like fluid. It's almost like the mucus in our gut, which is protective, and this secretion into the gut attracts microbes and the microbes then stimulate the plant to produce these polyphenols. And the polyphenols are then transported back up into the plant's leaves and root and seeds. So it's the main medicine that the plant produces to protect and defend itself against these environmental stressors. So what has happened with modern industrial or chemical agriculture that we have replaced the natural nurturing of the soil with manure and natural interventions have been totally replaced with chemicals and chemical fertilizer, which has pushed out the microbes out of the game because they no longer, so the plant now grows like crazy, like on steroids because it gets these nutrients directly from the chemicals that we put on them.

But what happens as a collateral damage is they no longer produce enough of these polyphenols, are more susceptible to pests and diseases and insects that requires then an additional intervention, a chemical intervention to spray all these insecticides and all these chemicals on them to fight the diseases of the plants. The chemical agriculture has started a vicious cycle that has not completely destroyed, but greatly compromised the health of the soil microbiome, the interaction of the microbes with the plants, the production of these polyphenol molecules. This is not trivial because the pesticides, good example, the Central Valley of California, the epicenter of chemical agriculture, biggest producer of vegetables in the country, and it's also an epidemic area for Parkinson's disease. There's a lot of studies that have linked the two together, the pesticides with this increased risk of Parkinson's disease.

Mary Purdy:

I've seen quite a bit of research on that as well. And this is a great area of passion for me personally, helping people to understand that how we are growing our food is having a direct impact on the nutrient density in the polyphenol content or flavonol content of those crops, of those plants very often, and how changing those agricultural methods can actually bring up levels of both micronutrients and these polyphenols. And there's some pretty decent research around that, although as you mentioned, this is not going to happen overnight, nor can it happen in every place. But that connection between the environmental interaction with the microbiome, it's a key part of this conversation, which I think is often getting missed. So I'm so glad that you're shedding light on this topic. In our last couple minutes here, I would love to find out from you, what is your go-to food, dish, meal, that you make sure that you get into your day or your week to support your own gut microbiome?

Dr. Emeran Mayer.:

So that has changed quite a bit since the publication of my two books. The pandemic, working from home and having the opportunity to experiment in our kitchen. I mean, not just me, also my wife, I have to say who makes these dishes. And we've implemented several things. One is this time restricted eating that we don't just jump, getting out of bed on a carb rich breakfast, but delay the onset so we have about a 16-hour period between our last meal in the evening and the first meal of the day. That's usually a bowl that contains mainly I would say seed, nuts, berries, plant-based milk, and a protein supplement. And it's satiating. It meets all the requirements that I now put on a dietary recommendation and that



lasts us really to the early evening. Sometimes a snack, which is typically some fruit-based snack during the day.

That was one thing that time restricted eating, trying to eliminate the constant need for snacks throughout the day that is so being so promoted in general in the field. In terms of dishes, it's the main emphasis on, so this is usually happen in the form of this early dinner, a large variety of plant-based foods. So usually when we count it's over the week, probably eat 15 to 20 different kinds of fruits and vegetables on a regular basis, which seems to be important. There's some microbiome studies that variety is equally important. And if you just eat tomatoes all the time, you won't have any benefit on your microbial diversity or ecosystem. In addition to that fermented food in our selection, many in the form of sauerkraut and fermented drinks and there's now a variety of sugar-free and sweetener-free fermented drinks available.

And then also fermented dairy products. I'm not a big fan of dairy anymore. I mean both for health reasons, even though that could be argued, but also largely for ethical reasons. We don't eat any red meat and our meat intake is really fish and some poultry, which is mixed with these vegetable dishes.

Mary Purdy:

I'm hearing from you, we've got variety is key, fermented foods, we've got our plant-based, fiber rich, polyphenol rich, and giving the digestion a time to relax overnight so that we're not continuing to tax it. And those are some strategies as well as mindfulness based stress reduction or whatever floats your boat when it comes to reducing stress to also be part of this picture of a thriving microbial ecosystem.

Dr. Emeran Mayer.:

A couple of short things, and one is, you talked about this giving your gut the rest. It's actually not resting when you don't eat. It generates a very effective mechanism, a cleansing mechanism that was a contractile wave that starts in your esophagus, goes all the way down, moves any indigestible parts into the large intestine, changes the microbial composition. So people talk a lot about SIBO, small bowel intestinal bacterial overgrowth, and do all kinds of interventions while your body has the best intervention, and it's keeping it empty for 16 hours where it does all the cleaning and moving the bacteria that don't belong in the small intestine back into the colon.

Mary Purdy:

And you're talking about the migrating motor complex, right?

Dr. Emeran Mayer.:

Migrating motor complex.

Mary Purdy:

I love that term.



Dr. Emeran Mayer.:

It's usually not mentioned to my big surprise, but that's an important part of it.

Mary Purdy:

Absolutely essential. If we keep on eating, that migrating motor complex doesn't actually fulfill its action and then the bacteria can stick around in places where they don't belong.

Dr. Emeran Mayer.:

Yeah.

Mary Purdy:

I'm sure people would love to know how they can find out more about you and what you do.

Dr. Emeran Mayer.:

So what I do is I've been a professor at UCLA for several decades now in Department of Medicine, Gastroenterology, had a big research program with two centers. We actually just launched the Goodman-Luskin Microbiome Center at UCLA, which in addition to our Center for the Neurobiology of Stress and Resilience. So that certainly keeps me busy and in terms of academic activities. And then I've spent an increasing amount of time in focus on education, not just of my colleagues and students, but to a wider audience. So in terms of social media and masterclass I'm working on and a documentary that we're producing for PBS which will come out in December on the mind gut connection. So yeah, it's a pretty busy schedule and I'm delighted to be able now to transmit a lot of the information that I gather in the lab and in my clinical research to the wider audience of patients and healthy people who are concerned about optimal gut health and gut microbial health.

Mary Purdy:

Well, people need to hear it. So we're glad to have you as a resource and we'll make sure that those links are on our website for people to be able to access. So thank you so much for enriching conversation today.

Dr. Emeran Mayer.:

Emeranmayer.com is the website, you'll find everything there, sign up for newsletter and podcasts, and you'll see a lot of information that's relevant to the conversation we had today.

Mary Purdy:

I, for one, am going to give a shout-out to your podcast, which I have listened to and really recommend to our listeners out there who want more information on a variety of different topics. So check it out at emeranmayer.com and you've got a new book coming out. Tell us a bit about that.

Dr. Emeran Mayer.:



Yeah, so this is the book, the Gut Immune Connection that came out last year and it's in some ways a sequel to the Mind Gut Connection. This didn't become quite apparent, I think to many readers who saw that. They thought, "Well, we're more interested in the mind than in the immune system." But it's coming out as a paperback this year in early summer under the new title, the Mind Gut Immune Connection. So it's very obvious that to understand the mind gut connection, you need to have an understanding what central role the immune system plays in that. Yeah, I'm very excited about this new addition.

Mary Purdy:

Excellent. The Mind Gut Immune Connection. It is in fact all connected.

Dr. Emeran Mayer.:

It is, yeah.

Mary Purdy:

Thanks for tuning into this episode of the Good Clean Nutrition Podcast, and thank you so much, Dr. Mayer, for speaking with us today.

Dr. Emeran Mayer.:

Thanks, Mary, it was a real pleasure. Thanks for the opportunity.

Mary Purdy:

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