THE MODEL HEALTH SHOW

EPISODE 626

The Anti-Viral Gut

With Guest Dr. Robynne Chutkan

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SHAWN STEVENSON: Welcome to The Model Health Show. This is fitness and nutrition expert, Shawn Stevenson, and I'm so grateful for you tuning in with me today. A groundbreaking study, published in BMC Medicine, investigated the relationship between severe COVID infections and being on pharmaceutical drugs prior to contracting said infection. After analyzing the data of thousands of patients, the researchers uncovered that, "Severe COVID-19 was strongly associated with the number of drug classes dispensed." This is something called polypharmacy. So, Poly meaning multiple or more or many, so the more drug classes, prescription drugs that people are on, the worse their outcomes were to this particular virus. But this isn't just for this virus. This is for a multitude of infectious diseases. There's something about the intake of prescription drugs that reduces our resilience against viruses. Now, of course, there's a component of underlying chronic diseases that the drugs are being used to treat, but the drugs themselves, according to this data, are part of the problem. The researchers found that the more classes of drugs people were taking, the greater their risk of severe infections.

Some of the worst effects from COVID were seen on people who were on, these were the top three drugs that were noted. One, anti-psychotic medications. Now, what can be going on here with antipsychotic drugs? So, this is looking at the treatment of a wide range of mental health issues, anxiety, depression, bipolar, the list goes on and on. But what these drugs do is that they influence our hormones and our neurotransmitters and neuropeptides that literally control how our cells are talking to each other, including our immune cells. Neuroscientist, Dr. Candace Pert, who actually discovered the opioid receptor by the way, and she's just one of my heroes, and I've been studying her work for many years, she said, "Viruses use the same receptors as neuropeptides to enter into a cell. And depending on how much of the natural peptide for a particular receptor is around and available to bind to, the virus that fits that receptor will have an easier or harder time getting into the cell itself. Because the molecules of emotion are involved in the process of a virus entering to cell, is it logical to assume that our state of emotions will affect whether or not we succumb to viral infection?"

She later discovered even more data affirming how our nervous system and our immune systems are intimately connected and in constant communication with each other's entire fields of psycho neuro-immunology, psycho-neuro endocrinology as well, understanding how our thoughts and our emotions deeply influence our immune system, our hormones, and this system truly does feed into itself back and forth. So, this is how anti-psychotic drugs can lead to more severe outcomes with viral infections. That was number one.

Number two was proton pump inhibitors. These are drugs that target the gastrointestinal tract that target stomach acid, and we're going to be diving in deep on that subject today with

our special guest. And the number three here was opioids. So again, these are drugs that are interacting with our nervous system in a very, very powerful way, our brain and nervous system, to influence what's happening, really altering our entire biochemical cascade. So, we know that the opioid epidemic that we're experiencing right now has become... For people between the ages of 18 and 45, the synthetic opioid, fentanyl is now the number one cause of death for people in their prime of life years. Again, that's between the ages of 18 and 45, it's the number one cause of death. So, to say that we're experiencing an opioid epidemic is an understatement, yet you're not hearing much about it. So that's why we do what we do, is to get this information out into more hearts and into more hands, so we can take action to help to turn this thing around. But it starts with us, and so very grateful for this and to be able to have on our special guest, somebody who is truly one of my favorite people in the world, such a big heart and passion, and her knowledge base is just remarkable. She's already just making such a huge difference, but her new project, game changer.

Now, one thing that I know about her, she's also a huge proponent of making sure that we're getting our micronutrient needs met. The normal medium, and this is something I grew up with. I grew up... My grandma would give me these little Flintstone Vitamins. The Flintstone Vitamins. It was candy. It was candy to me. I loved it. Alright. "Can I get two? Can I get two?" It's just more good for you stuff, right? These are synthetic forms of these key nutrients that the human body is simply not really associated with throughout our entire evolution, and suddenly we take something that would be derived from a real food source and have a synthetic version and thinking that it's going to have the same reaction in the body. Well, the data has affirmed that this is simply not the case. There's a much higher bioavailability when the nutrients are coming from whole food sources. So, in place of this multi-vitamin paradigm, we want to use whole food concentrates of super foods, because, yes, it is more difficult to get this through our diet, to get our abundant needs for micronutrients because these micronutrients help to handle stress. We live in a very stressful world today, so a lot of the stuff is getting zapped from our system. Like Magnesium, for example. Magnesium is responsible for over 650 biochemical processes in the human body that we're aware of. That's just what we're aware of.

So many of the processes of the body involving the nervous system and shifting the body from parasympathetic to sympathetic, our muscles, our digestion building bones, the list goes on and on and on, magnesium is important, but it gives zapped from our system because it's doing so much, especially right now. This is the number one mineral deficiency in our world today, which is not an accident, also magnesium has critical roles in mental health as well, helping to manage and regulate feelings of anxiety, there's so many different really important key things that magnesium is doing. Absolutely get it from our diet, green things, if it's green is going to be a great source of magnesium, but the very best sources are coming from the green dense super foods like spirulina, like Chlorella, these are wonderful sources of magnesium, but also bio-potentiators, other co-factors. So, spirulina is 71% protein by weight, an abundant source

of amino acids that really help and work as co-factors to do other processes in the body. We're talking about hormones and neurotransmitters, these are made from proteins, these are made from amino acids, these are the most dense sources gram for gram ever discovered in nature, speaking about spirulina and Chlorella. Chlorella is about 50% protein by weight and also rare nutrients like phycocyanin is found in spirulina.

Phycocyanin is one of the rare nutrients that's been found to help to stimulate the production of new stem cells, stem cell genesis. You just can't get that kind of benefit from a Flintstone vitamin, it just... It doesn't match up. You're not getting that from Fred, but Spirulina definitely has that. And this is something that my family utilizes all the time, the spirulina, Chlorella, ashwagandha and other super food combinations, whole food dense, cold process super food concentrates coming from organifi Green Juice. Go to organifi.com/model that's O-R-G-A-N-I-F-I.com/model. You get 20% off their incredible green juice formula and it tastes good, that's the key. They actually have this wonderful flavor combination, again, utilize things like mints and coconut water to make it tasty so that kids love it as well, so kid tested, parent approved. Alright, head over there, check them out, organifi.com/model for 20% off. Now, let's get to the Apple Podcast review of the week.

ITUNES REVIEW: Another five-star review titled “wake up people” by “Danny B. Glass. “I've enjoyed listening to Shawn for about a year now, and a lot has changed in that year. I've enjoyed learning the histories of different health and wellness strategies and how they got started. Now, being in the midst of a global pandemic, he's taking big leaps by showing the other side of the story, the story they apparently don't want you to know, combined with wit and hard backed evidence, Shawn provides us with a deep and powerful understanding of what's really going on thank you for waking up the masses. Namaste.”

SHAWN STEVENSON: Thank you so much for leaving that review over on Apple Podcast. I truly, truly appreciate it. And on that note, let's get to our special guest and topic of the day. Our guest today is Robynne Chutkan MD. She's a board-certified gastroenterologist and author of several bestselling books, including Gutbliss, The Microbiome Solution, the The Bloat Cure. Now, the new book, The anti-viral gut. Dr. Chutkan received her bachelor's degree from Yale University and her medical degree from Columbia College of Physicians and Surgeons, where she also did her internship and residency and served as Chief Resident. She completed her fellowship in Gastroenterology at Mount Sinai hospital in New York. And Dr. Chutkan has been on the faculty at Georgetown University Hospital since 1997. In 2004, she founded the digestive Center for wellness, an integrative gastroenterology practice, dedicated to uncovering the root causes of gastrointestinal disorders. Dr. Chutkan has been featured as a medical expert on The Today Show, CBS this Morning, The Doctors, The Dr. Oz Show, she has her own PBS special entitled Gutbliss and so many other publications like Wall Street Journal,

The New York Times, The Atlantic, the list goes on and on and on. Now she's back here on the Model Health Show to talk about this very important topic, the anti-viral gut.

Let's jump into this conversation with the one and only Dr. Robynne Chutkan, so good to see you. Thank you for coming. You're here with me.

DR. ROBYNNE CHUTKAN: I am here.

SHAWN STEVENSON: Like we've known each other for years. And it's our first time getting to see each other, to hug...

DR. ROBYNNE CHUTKAN: In person. It is so awesome, but I told you when I was out last, I said the next time I'm coming out to see you, so thank you so much for extending the invitation and having me.

SHAWN STEVENSON: It's my pleasure. You've written one of the most important books, truly of our time. This is not an exaggeration. You're really getting at the heart of something that has impacted our lives massively the last couple of years, and the long tail effects obviously are still to come. And you're talking about this really powerful and important connection between our gut and our susceptibility to viruses. So, let's start there, let's talk about what is it about our microbiome and our gut health that can make us more susceptible to viral infections.

DR. ROBYNNE CHUTKAN: Shawn, you know, even in medical school, which for me was a long time ago. I don't think I fully appreciated the relationship between the gut and the immune system. So, let's just start with physically, where is the immune system located, 70-80% of it is physically located in our GI tract. So it is, you have the gut lining, that thin membrane with little holes in it to allow nutrients in and waste matter out, and on one side of the gut lining in the gut lumen, you have the trillions of bacteria. And on the other side, separated by a membrane that is literally razor thin, you have all the immune cells and there's constant communication between the two. So, when you think about it, our immune system is exposed to trillions, if not more, whatever the higher number is in that, of different organisms that are floating through the GI tract, because remember, a GI tract is open to the environment, right. All the stuff that comes in through our mouth, and so they're all these microbes, potential toxins, food particles floating around in the gut, and the immune system has to decide which of these things are potentially a threat versus which is just harmless stuff that's coming in. And how is it they decipher that, it's the gut microbes that direct them to say, Okay, this is something you need to react to, this is something you can relax, so this is actually helping.

So, think of the gut microbes is like traffic control for the immune system, and so that interaction, that hand-in-glove relationship is critical for how our immune system functions.

SHAWN STEVENSON: Wow, so there's this really... It's a very intelligent system based on our choices based on the health of this system, of how well it's going to be able to do its job, and so I would imagine that if there is some derangement happening to be able to assess what a threat is and to properly respond is going to be hammered.

DR. ROBYNNE CHUTKAN: Absolutely, so if you can even sort of physically think about what that looks like, right, so you have this thin membrane, immune cells on one side, microbes on the other, think about what happens if there's damage to the gut lining. If those little holes become big, and so things are coming through now that communication is disrupted. Or think about what happens if they've got microbes, you don't have a full complement or there's imbalance. And I give you an example of that, there's a bacterial species called Bacteroidetes. And Bacteroidetes is one of the gut bacteria that's very important in triggering the immune cells to release cytokines and to sort of start this process, this immune cascade that leads to destroying a pathogen, making antibodies, etcetera. And so Bacteroidetes, when they sense certain viral threats, they're in the lining of the intestinal wall right there, up against the wall next to the immune cells, and they trigger the release of something called interferons. And Interferons are called interferons because they interfere with viruses, etcetera.

So, the Bacteroidetes triggers the release of these interferons and then that starts his immune cascade. So, if your population of Bacteroidetes is disrupted, if you don't have enough, if you kill them all off with antibiotics, if you haven't been cultivating a healthy gut bacteria, a healthy microbiome through what you eat, that signaling can't happen, and that immune response may not get triggered. So, it is both a sort of physiological process, but it's also an anatomical physical process that's happening right there in your gut.

SHAWN STEVENSON: Wow, that's so powerful. And also, that category or classification of bacteria is also associated with healthy body composition, insulin sensitivity but it has this huge role also with immune system that again, you're really bringing to light versus that class put up against Firmicutes, for example, which again, everything has its role, but Firmicutes are more associated with obesity, insulin resistance, and also dysfunction in the immune system.

DR. ROBYNNE CHUTKAN: And an interesting point about Firmicutes and evolution, is that in people of Northern European ancestry who thousands of years ago had to endure cold winters, that class of bacteria, that family was more involved with being able to store calories as fat to get through a long winter when food wasn't available. We don't have long winters when food isn't available anymore. Right, so there is this evolutionary development of the bacteria, but they're now maladaptive to the environment that we live in.

SHAWN STEVENSON: That's so fascinating, it's just like nature finds a way. There's a purpose behind all of these things. But as we'll talk about today, our environment internal and external today it's so abnormal so quickly, it's probably a big reason why we're experiencing what we're experiencing. And in the book, you really highlight that COVID 19, even though the way that the information is kind of been propagated and we've been inundated with certain beliefs about things, it wasn't necessarily very indiscriminate. You shared that, and this is a direct quote from the book, "It's less about the potency of the pathogen and more about the health of the host." So, let's talk about that.

DR. ROBYNNE CHUTKAN: Yeah, it came to me that there's a lot of fear around COVID 19, around viruses and so on, and don't get me wrong, there's a lot to be fearful of, especially in the beginning when this is unknown. But what I want to remind people is that for every condition for every disease or illness for cancer, for heart disease, for bacterial infection, for viral illness, the health of the host matters, and it matters greatly. If you are an 80-year-old who's a smoker or hypertensive, diabetic, sedentary, overweight, and you get a heart attack, you're going to have a very different outcome from somebody who's 25 and healthy and exercises and is in great health. So, for every condition we're talking about the health of the host, what we call our terrain, what does our soil look like. So, I like the soil seed comparison. When we think about terrain theory, Pasteur's germ theory says that an organism, a germ, a pathogen gets into our body and makes us sick, and that's true. SARS COV-2 can get into our body and make us sick, but terrain theory, which was championed by another Frenchman Antoine Béchamp. Terrain theory says that if our soil is healthy, that seed can pass through our system, may make us a little bit sick, but we'll recover...

We're not going to have the same bad outcome, and we have some fascinating data that really validates terrain theory. So, if you look at one of the landmark studies that was done during this pandemic, it was done looking at microbial analysis as a predictor of outcome, and they found that the health... And not just the health, but the particular representation of certain organisms in the microbiome, which was a marker for health, could predict outcome with 92% accuracy Shawn. That's way more accurate than looking at comorbidities like heart disease, lung disease, whether you're a smoker, et cetera, combined, even when you throw in inflammatory markers in the blood, like C-reactive protein, etcetera. You still don't get close to 92%. And what they found was, again, high levels of a bacteria Faecalibacterium prausnitzii which is a bacteria that is associated with eating a lot of plant fiber was protective. And people who had low levels of Faecalibacterium prausnitzii were more likely to have respiratory failure, be on a ventilator, be in the ICU and even die.

And conversely, they found high levels of a bacteria called Enterococcus Faecalis, a bacteria that we know can penetrate the gut lining, get into the blood stream cause problems. High

levels of that one were associated with poor outcomes. So, it's kind of incredible that a little schmear of stool can give you all this information, but when you think about the fact that your microbiome is a more unique identifier of you then your own DNA, it's not surprising, right.

The microbiome reflects everything about you, where you've lived, what you've eaten, medications you've taken, even your thoughts, because stress is also reflected in the microbiome, can affect the balance of gut bacteria. So, for me as a gastroenterologist, when I was in med school long time ago, people were like, "Why do you want to do GI?" You want to wade around in people's stool? Why don't you do dermatology or Ophtho or something cool?" And I'll tell you that gut is having a moment, right? So now I'm like, "Here's why I wanted to be a gastroenterologist, stool that you think about as gross and waste matter is a treasure trove of information about us, about our risk for illness, about what's going on with our bodies."

SHAWN STEVENSON: Wow, you were super ahead of the curve, and this reminds me of this William Churchill quote, "There's nothing more powerful than an idea whose time has come." And like you said, the gut is really having a moment right now, and you mentioned 92% accuracy, being able to check what's going on with your microbiome, 92% accuracy, and being able to assess your outcomes via a COVID infection, so it's just like this biomarker is so remarkable at telling how your body's going to react to this virus and probably any other thing we're going to be exposed to.

DR. ROBYNNE CHUTKAN: Absolutely, and it's not an accident, but some people have high levels of Faecalibacterium prausnitzii and other people have low, that's directly related to diet. So, you can't unfortunately just go borrow some Faecalibacterium prausnitzii from your plant-eating friend or from the health food store, you've got to cultivate that, but the beautiful thing about this Shawn and the optimistic message and the reason why I'm so excited to bring this information to people is that you can actually change your microbiome, and you can do it pretty quickly. I mean you can't change it overnight, but you can make little consistent changes to how you live, how you eat, even how you think, how you sleep, all of these things that can make you healthier and more resilient.

SHAWN STEVENSON: Yeah. Just start the process, start today then. The best time was probably to start last year, but the second-best time is now. Another quote from your book, you say, "Susceptibility and poor outcomes are almost always predictable and preventable, or at least reducible," alright so this stuff isn't just random, and seeing... "Being able to really assess our susceptibility and also our potential resilience under these conditions is really important, and with that said, this leads to another part that you mentioned, counseling and strategizing about that risk and how to reduce it are much more effective than any drug or medical intervention because medications are critically important for those who need them, but for

the majority of us, our body's own ability to resist, heal and recover from viruses is vastly superior."

DR. ROBYNNE CHUTKAN: And I want to unpack that a little bit because I want to make sure people understand. We're not blaming... I certainly am not blaming anybody for poor outcome, anybody who gets sick from this viral illness is a tragedy, and certainly people who have died or who are still suffering with post-viral symptoms, that is a tragedy. But you can acknowledge that and also at the same time, point out that there are risk factors that we know about, and we don't just know about them because we have sort of pulled it out, we know about them because there is really reliable data behind it. So, if you look for example, at having obesity, we know that is a significant risk factor that is associated with a much higher likelihood of doing poorly, and when you think about it, there's some very clear reasons, somebody who has obesity, particularly if they've a lot of central obesity, it's harder for the lungs to expand, so having obesity interferes with mechanical ventilation of the lungs.

And this isn't just true for COVID, this is true for pneumonia, for any respiratory illness, there are going to be worse outcomes. And when you can't inflate and deflate your lungs properly, what happens is that bacteria can pool in some of these spaces in the lungs, and you're at high risk for bacterial super infection, so now you have a bacterial pneumonia on top of a viral illness. We know that in people who have obesity, they have factors floating around in the blood, pro-inflammatory factors like clotting factors that can make you more likely to clot and have problems there. We know that at a post tissue itself is immunologically active and is producing sometimes extra cytokines that are leading to an overblown immune response, you're over-shooting the mark, and you're ending up with cytokine storm and acute respiratory distress syndrome, etcetera.

So, we know that there are these medical factors associated with being obese, with having obesity, and it's critically important that we provide people with meaningful tools from a public health, from a policy point of view to help people, and we have to look at this as a collective problem. Somebody being obese is not just their problem like it sucks to be you, too bad. If you think about viral shedding, we know that in the setting of obesity, viral shedding can be prolonged by as much as 42% longer. And so, what that means is that somebody who has obesity can be shedding a virus longer, there's more opportunity for transmissibility and there's more opportunity for viral transformation to potentially a more virulent form of the virus, so this is a collective problem, we are only as healthy as our least healthy citizen. So I think we've seen an incredible spirit of generosity and graciousness with this pandemic with people coming together, helping their neighbors and so on, but I think we really need to take a different approach to obesity in our society, and we need to look at it as it's a problem for our society, not for the individual person only, and what can we do to help our brothers and sisters who were struggling.

'Cause it's hard, it's very hard, especially if this is something that you've been dealing with from a young age, it's hard to lose weight, and how can we have more resources for people in terms of access to healthy food, access to spaces for leisure, etcetera, and it's particularly important in certain communities. If you look at our African American community, we have extraordinarily high rates, and it's not surprising that those rates are also tied to economic disadvantages, etcetera.

SHAWN STEVENSON: Yeah, thank you so much, you just unpacked really why obesity is a risk factor because, just to be clear, again, this is not about a vanity metric, this is about true human functionality. I love you gave a mechanical example with the lungs, but also you gave that kind of internal... The word inflammation is getting... It's also having a moment right now in talking about how fat cells themselves are kind of sending out a false distress signal when they're under stress because of the contents that they're forced to carry on, and it's putting the body into a pro-inflamed state and then a pro-inflammatory virus exposure comes along, what do you think is going to happen? We talked about this, I think I sent you the study early on, but it's one of our conversations over the last couple of years, but the CDC did a huge meta-analysis over 800 US hospitals, over 540,000 COVID-19 patients, huge set of data. The number one risk factor for death in their assessment is obesity.

DR. ROBYNNE CHUTKAN: Yes.

SHAWN STEVENSON: The number one risk factor. It stood out.

DR. ROBYNNE CHUTKAN: And particularly people under 65, it's way more likely. The number I believe from one of the large studies was 113% more likely to be hospitalized, 70 something, maybe 76% more likely to be ventilated and a very high number more likely to die also. And again, this is something we can do something about. By the way, I love how we exchange these articles and we geek out, and I'm like nobody else is really interested in this, but Shawn and I are exchanging these texts and like, "Can you believe that? Look at this." Yeah, thank you, appreciate that.

SHAWN STEVENSON: Of course, and we're doing things to again get to... I'm so grateful actually for this experience in a way, because... And it takes some time to process things of course, but it's giving us an opportunity to really look at our state as a society. I think that especially when we're working towards health and wellness, we can get into our own little bubbles, and we can overlook that so much has been going wrong in the last few decades, the rate of obesity as we talked about before the show got started, in children has tripled since the 1980s. Something is severely wrong here and we can start to let things linger a bit, when right now something like COVID-19 brings about a sense of urgency to make some changes because again, this is the

number one risk factor, but we did the thing we tend to do which is we got to find a drug to try to fix this, and again, just look at the outcomes from that whole thing, and we can try to frame things in a way that oh, this is successful, but at the end of the day, our constant desire to drug our way into and out of things has it led to a situation where... And this is just it is what it is, a $4 trillion dollar health care system with pharmaceutical companies making hundreds of billions of dollars and yet we're the sickest society in human history, something is not matching up here.

DR. ROBYNNE CHUTKAN: And we're much sicker than countries that spend a lot less money.

SHAWN STEVENSON: A lot less, right.

DR. ROBYNNE CHUTKAN: And here's the thing, I am a conventionally trained doctor, I have an integrative approach, I am all for judicious use of medication. I am delighted personally and professionally that we have ventilators and monoclonal antibodies and all sorts of things for people who need them, but wouldn't it be so much better if we didn't need that?

SHAWN STEVENSON: Yes, exactly.

DR. ROBYNNE CHUTKAN: If we were healthier and we didn't need that? And the outcome is different. These things can save lives for sure, but again, a healthier host means that you're much less likely to need these things even with a potent pathogen. And here's the thing, the book is very deliberately written in a way that this is not a scary book, this is not meant to scare anybody into doing anything. If anything, I think it's an optimistic message, it's a hopeful and a reassuring message, but I also want to point out when you look at the data, and this is a study from Duke University in 2021, they looked mathematically at the likelihood of a pandemic like COVID-19 happening in someone's lifetime, and they calculated... And this is... This number shocked even me, 2% per year risk of something like this happening based on past occurrences, which means that for somebody born in 2020, there is a 40% chance that something like COVID-19 would happen, but yet we were all surprised.

But the data suggests we shouldn't be surprised. If you look at the last 50 years, Shawn, which is around how long I've been alive, give or take a few years, if we look at the last half a century plus six... If we look at the last half a century, we see that there have been more than 30 new viruses for which there is no cure or real meaningful treatment, hepatitis C, HIV, Ebola, SARS-CoV-2. And this is not likely to change any time soon, in fact, it's probably likely to accelerate because of the way we're living, we're encroaching on animals ' natural habitats, etcetera and all of the different factors, that's not the only one.

SHAWN STEVENSON: Yeah. We would think again, from the surface level that our level of innovation and education that infectious diseases have been going down, and I'll put the study up for people to see, they've actually been going up. And again, you've got to step back and ask why is this? What's happening? Where even infectious... Not only are chronic diseases at epidemic proportions, but even infectious diseases, when it... On the surface was just like we're creating situations where we have so many different treatments to stop these things, we're not really that good at it. So with that said, getting back to the most important faculty, which is our body's own inner intelligence, you said something earlier, you mentioned that when it comes to our microbiome and this immune system connection, this in many ways can even have a more profound impact than our DNA itself, and this brings me to the point of even our bacteria, this trillions of bacteria that we're carrying have their own genes, their own DNA, and if we go gene for gene, over 99% of the genes we carry are bacterial.

DR. ROBYNNE CHUTKAN: We are way outnumbered, absolutely, we are way outnumbered. And when you think about it from a gastroenterology point of view, people think about gut bacteria as being intimately involved in digestion, and that's absolutely true, but our gut bacteria also synthesize vitamins. If we look at something like vitamin K, vitamin K is essential vitamin for clotting, without vitamin K, our blood cannot clot, and if we get even somebody drawing blood from us, we would bleed to death.

When people come into the hospital, they are often given antibiotics regardless of whether they need them or not, but let's say somebody comes in with a fever, what we call fever of unknown origin, nobody's sure what's going on, are given a broad-spectrum antibiotic just in case. After about four or five days, the phlebotomy team in the hospital, the folks who do the blood drawing will often put a note in the chart saying this person needs vitamin K, their blood isn't clotting, and they'll have to get a dose of vitamin K. Why? Because the antibiotics have killed off so much of the bacteria that now they can't be producing vitamin K. So, this stuff isn't just theoretical, this is stuff we see in real life all the time, and we know if we look at something like rotavirus...

Rotavirus, a viral illness that kills about... It's a diarrheal illness, kills about half a million children every year globally. My daughter had it as a baby, unfortunately she was six, she was hospitalized, but she recovered. We know that if you take proteins from certain bacteria and inject them into mice infected with rotavirus, it helps a bacterial illness. And when we look at what that means clinically, we see that children who have received antibiotics in the recent time before a rotavirus illness, five times more likely to get rotavirus, much more likely to have a severe form of rotavirus and a poor outcome. And when I think about my daughter, and of course her history is central to what got me interested in this field of the microbiome, as a baby who was born and had lots of antibiotics at birth and for the first few years and was very sickly, when she had that rotavirus illness, and I didn't know this at the time, and because this

stuff just wasn't known, people weren't thinking about this even within the medical community, this wasn't on our radar.

She was being treated with antibiotics basically every month for ear infections, for pharyngitis, for strep, and the doctors weren't putting together that all the antibiotics she was getting were really weakening her immune system and making her more susceptible to being ill. So, when she did get the rotavirus, that came right on the heels of having been treated with yet another course of antibiotics for an ear infection, but we didn't have the data then, and when I tell you, Shawn that it wasn't on our radar, it wasn't on our radar. In fact, when she was admitted with rotavirus, diagnosed with rotavirus, what do you think they gave her?

DR. ROBYNNE CHUTKAN: More antibiotics...

SHAWN STEVENSON: More antibiotics.

DR. ROBYNNE CHUTKAN: For a viral illness that is completely unresponsive to antibiotics, that was probably... I can't say it was caused by, but that she... Her risk for it was increased by the fact that she's been on antibiotics, and she get... So, we have to think about these things differently, and we have to move away from this knee-jerk response to we have to do something. I actually have to say I'm grateful to my dad who's 87, retired orthopedic surgeon, 'cause his way of dealing with us when we were sick was go lie down, drink a glass of water and nobody really wants to hear about it. He was so worried that we would be hypochondriacs, he sorts of... He might have taken it a little bit too far, but it was the idea that you were going to take a pill 'cause you weren't feeling well, I mean if you were really sick, don't get me wrong, we all went to the doctor if something was really wrong, but you had a little ache and pain, go lie down and drink some water, you'll feel better. So, we have to...

And I recognize it as a physician, I'm in a better position to evaluate for my family if they can just go lie down and drink a glass of water versus if something's really going on, but we have some studies out there that really pinpoint for listeners what's going on. So, one of the studies from the pediatric literature is that pediatricians prescribe antibiotics 63% of the time when they perceive the parent wants an antibiotic and 7% when they don't. So that's a lot of gray zones for whether the antibiotic is really necessary.

SHAWN STEVENSON: That's a lot.

DR. ROBYNNE CHUTKAN: So again, I'm not advocating don't take an antibiotic. If you have a serious infection that needs treatment...

SHAWN STEVENSON: Bacterial infections specifically.

DR. ROBYNNE CHUTKAN: By all means... Bacterial. But you need to be the kind of person with your doctor, whether you're a parent or it's for yourself, to advocate and to ask the most important question which is, is this antibiotic really necessary? You'd be surprised how often the answer is no.

SHAWN STEVENSON: Yeah. And also, people who know this data, you've known this for quite some time, have been advocating for education around this, but the paradigm has not shifted that much, even when COVID-19 hit the scene, there's a nice little body of evidence where folks, physicians were using antibiotics to try to treat this viral infection early on in this process. And again, it's just like... Because again, this is a miraculous drug that we discovered and it has had some great benefits, but it's been leaned on so hard for so much... Recently we did a show on skin health, and just that field of dermatology, antibiotics is one of those go-tos for wide-ranging things with our skin and not looking at what is the underlying cause of the eczema or the acne, the same thing when we're talking about susceptibility to viruses, and this is where your book really gets into the nuts and bolts of how do we address this in a much more intelligent way. And you talk about building up our host defenses, and one of the primary things you talk about is stomach acid.

DR. ROBYNNE CHUTKAN: Yes.

SHAWN STEVENSON: Why is that?

DR. ROBYNNE CHUTKAN: You know Shawn, this aspect of it, stomach acid was really the motivating factor for writing the book, and I'll tell you what happened. In 2020, there was a big study that came out, population-based study, 54,000 people down in the US looking at... Asking a simple question, is there an increased risk of COVID in people who are blocking stomach acid with a class of drugs called proton pump inhibitors? Now, as a gastroenterologist, I've seen for years, for decades that people... And this is known in the literature, people who are taking these drugs, proton pump inhibitors that essentially block all your stomach acid, I'm not talking about an antacid that you take from time to time, I'm talking about people are taking these drugs daily, we see that Clostridium difficile, that hospital acquired, usually antibiotic-associated infection... Bacterial infection is more common if you're taking a PPI, we've seen food-borne illnesses like Campylobacter jejuni more common if you're taking a PPI, and we've seen viral illnesses like outbreaks on cruise ships well before COVID, if you're taking a PPI more common. So, it didn't really surprise us in the GI world, but it surprised us how high the risk was. So, in this study, taking a PPI once a day, twice as likely to test positive for COVID, taking a PPI twice a day, three to four times more likely.

And there was something here Shan, is that again, these are drugs, powerful, super effective drugs, very popular because they're very good at what they do, which is they shut down that proton potassium ATPase stomach acid pump, so they're very good at that. And if you're somebody who has acid reflux, that means that you can maybe do some things that you shouldn't be doing, like eating a big, huge meal at 10 o'clock at night, drinking a little more than usual, a couple more cups of coffee in the morning then you should have, and it means that when that acid comes up, it's now neutralized, it's alkali, you don't feel it, but remember that the acid reflux is part of your body's feedback loop, it's there to protect you, to remind you, to give you a little nudge or a kick in the pants depending on how bad your symptoms are, that what you're doing is a problem.

SHAWN STEVENSON: Is hurting you.

DR. ROBYNNE CHUTKAN: Yeah. You're over-filling your stomach, you're eating too late at night, whatever it is. Now, there are other reasons people get acid reflux, some people have problems with the sphincter, it can't close properly, etcetera, some people have hiatal hernias, congenital deformity, so I'm not suggesting that probably...

SHAWN STEVENSON: That's the minority though.

DR. ROBYNNE CHUTKAN: That's a minority, not everybody who has an acid reflux is doing something they shouldn't be doing, but the majority of people are. It's not something that just falls out of the sky, and acid reflux has nothing to do with acid production. Over-production of acid is a condition called Zollinger-Ellison, very rare, where you over-produce acid, it's one in a million people, that's not what's going on, for the vast majority of people, that lower esophageal sphincter, the little valve between the esophagus and the stomach is inappropriately opening and the acid is coming up and it's inappropriately opening because we're eating too much, too late, too much high fat food or we are eating and then lying down flat, go to bed, all these different reasons or too much caffeine that opens it up, even chocolate can do it unfortunately. So, there are things we know how to treat this. We know how to take care of this, but in our medical industrial complex society, we just throw a drug at it, take a PPI, you'll feel better. Now some people, that's what they want to do, but I know that there are lots of people out there who if somebody sat down and explained this stuff to them...

And if they had somebody to work with, maybe a health coach or a nutritionist, they would be delighted to do those things and to feel better, but that's not our medical approach because that doesn't make a pharmaceutical company gazillions of dollars. Somebody eating an earlier dinner, who profits from that? And so, we have to ask these questions and again, glad that these drugs are there, there are conditions, bleeding ulcers, etcetera, people who have a pre-malignant disease called Barrett's esophagus, these drugs can be lifesaving in those instances.

So, hooray for PPIs, but let's use them more judiciously because what's happening, and as you said, the pendulum's swinging the other way with how we depend on this stuff, now we see that these drugs are putting people at risk for a viral illness, people who don't necessarily need to be on them. And the data, particularly in people over 65, there's some data from England that suggests that 70-80% of prescriptions for PPIs in people over 65 are unnecessary.

SHAWN STEVENSON: Oh, mind blowing, so mind blowing. So, this leads into how in the world is PPI use and reduced stomach acid creating the condition to where we're more susceptible to a viral infection?

DR. ROBYNNE CHUTKAN: Yes. Let me bring it back to that. And again, when that study came out, I said to my husband who's not in medicine, he's counterterrorism, counter-intelligence world, cyber security, so he's sort of my sounding board. I said, "So you know that if you're on a PPI, you're more likely to get sick from COVID?" And he looked at me, he was like, "What? How would I know that?" He was like, "I don't know that." And then I started asking some of my medical colleagues, Shawn, and they were like, "Ah, news to me," and that's really when I realized okay, there's some public health stuff here and general messaging and education for people that needs to happen, and so it's a very basic defense mechanism where when the virus gets into your body, which is often through the mouth, it can get into the stomach and infect intestinal cells, and in fact, we have about 100 more ACE2 receptors in the GI tract than we have in the lungs, which is why GI symptoms are so common, so it can infect intestinal cells. When you have stomach acid, when that virus travels and reaches to the stomach, the stomach acid denatures the viral protein, it unravels it and renders the virus inactive.

So, it is like Top Gun, one of our main defenses, and there are millions of people out there sabotaging that defense unnecessarily and unknowingly. And so, this is the kind of information I want people to know. If you need a proton pump inhibitor and you have a clear indication for one, and you've done the math and you've looked at the sort of risk-benefit analysis, and you and your healthcare practitioner have decided yes, you need to be on a PPI, that's fine. Maybe you could think about could you be on a PPI once a day instead of twice a day, could you even take it every other day? So, there are things you can do beyond just stopping it, but could you substitute it? If you're somebody who's having reflux and you're not having it all the time, could you maybe take an antacid instead, which is something you could take on-demand only when you need it instead of taking this daily drug after you've done the things, eat a bigger lunch, lighter dinner, eat earlier, all these other things. So, this is just the basic information that I want people to have, I want people to understand how their body works, how their gut works and basically what it's trying to do to defend you and protect you, so that they can know not to dismantle those things and not to sabotage them and interfere with them.

SHAWN STEVENSON: Yeah, this is a natural, again host defense that our body does, this intelligence, and we just come along with a blunt instrument basically, and just stop it from doing their thing. And so even with that said, if it is an appropriate circumstance for PPI, you're going to need, with the education, now let's stack conditions in other ways if you're going to be on this thing, but it's really again, such a lack of education around this stuff, and this is why this is so important. So, one of those studies mentioned, this was published in BMC Medicine, and it investigated the relationship between severe COVID infections and being on pharmaceutical drugs prior to contracting the infection, they found that polypharmacy, the more drugs that you're on, the much higher risk... And this is a direct quote from it, "Severe COVID-19 was strongly associated with the number of drug classes dispensed." So, the more drugs you're on, the more likely you were to have a severe infection. Specifically, they identified three specific categories of drugs that were the most villainous in this circumstance.

DR. ROBYNNE CHUTKAN: Yeah, most strongly correlated, yeah.

SHAWN STEVENSON: Number one was anti-psychotic drugs, which this influences hormones, neurotransmitters, neuropeptides, and other cellular control. Number two was PPIs, proton pump inhibitors, and as you mentioned, and I'll just share this part really quickly, the study stated, "As SARS-CoV-2 is at least partly an enteric infection," meaning it's related to the gut, "And the ACE2 receptors expressed in the intestine, it is plausible that proton pump inhibitors and other drugs acting on the gastrointestinal tract could increase susceptibility to severe COVID-19." And this has been your message that you're packaging up in this digestible... Alright, there's a little...

DR. ROBYNNE CHUTKAN: Pun intended.

SHAWN STEVENSON: But this digestible way because most people are not on top of this data like we are and actually going through, looking at this peer-reviewed evidence, but this isn't new, even this understanding about acid that our bodies are producing and its importance in reducing our susceptibility to viruses, this has been one for quite some time.

DR. ROBYNNE CHUTKAN: There was an article published in the GI literature several years ago, I think this article was from 2014, that showed that people who are taking chronic proton pump inhibitors for more than a few months at a time, that their microbiome is so disruptive, it is the equivalent of being on antibiotics. So, people can take frequent antibiotics, but most people are on antibiotics for years. Sometimes for skin, which is unfortunate for acne, but people do take proton pump inhibitors for years and they don't think about it, they don't. So, I want people to think what is the cost of this and is it worth it? And also, there's so many things in the book, Shawn, the stomach acid, the gut lining, mucus, fever, all... I want people to

understand how their bodies work and to understand your body and your gut specifically has your back, this thing that it's doing is not to hurt you, it's to protect you.

SHAWN STEVENSON: I think that... And even just talking with you right now, I'm really realizing this, that acid is a dirty word in our culture, it's really villainized, put in this one category, acids bad! We want everything alkaline, but your body has certain places, certain organs, certain processes that are more acidic and some are more alkaline, it's just this brilliant dance happening within the body, but in this context, acid is a bad word.

DR. ROBYNNE CHUTKAN: And for our female listeners, I want to talk about acid in terms of vaginal health because in the gut, diversity is really key, we want a wide variety of different organisms, but in the vagina, we actually want monoculture, so in the vagina, lactobacillus bacteria in a healthy vaginal flora are the dominant species and lactobacillus, not surprisingly produce acid, lactic acid, and they produce that to keep the vaginal environment safe from marauders, from viral invaders like HSV and HIV and HPV, human papillomavirus virus, human immunodeficiency virus, herpes simplex virus. And so, what we see, women who have a healthy vaginal microbiome are much less likely to get infected after being exposed to these viruses, not just herpes and human papillomavirus virus, but even HIV, compared to women who have bacterial vaginosis and their lactobacillus have been disrupted and they have high levels of other bacteria like Gardnerella, Prevotella, etcetera. Now, let's be clear, I'm not suggesting that you rely on that as protection against a sexually transmitted disease, like, "I've got a lot of lactobacillus, I'm good." No, you still need to have protected sex, but it is clear that the vaginal microbiome is one of the most important defenses against viral invaders just like in the gut. This stuff is potent, it's potent.

SHAWN STEVENSON: So how is that environment becoming dysfunctional?

DR. ROBYNNE CHUTKAN: Well, we're seeing rates of bacterial vaginosis and the crazy thing, Shawn, is that most OB-GYNs treat bacterial vaginosis, a condition that's usually a result of overzealous use of antibiotics, you treat it with more antibiotics. They treat it usually with something called MetroGel or Flagyl. And what they're doing, and understand what they're doing, they're trying to reduce the level of the Gardnerella and the Prevotella and the other bacteria that have risen in terms of their amounts and to be clear, these are bacteria that are normally present in the vaginal flora but now they're over-represented. So, they're trying to decrease those levels, but in the process of decreasing those levels with an antibiotic, they're also further, further decimating the lactobacillus, and so you end up in this sort of vicious cycle. Often, when you're treating antibiotics, and you're... When you're treating bacterial vaginosis just with antibiotics and relying on that, its people get better and things feel great, but then after a while, as the microbiome starts to flourish again, you see that again, these other organisms increase and now the lactobacillus are also low, so different approaches.

And so, in my practice, I'm a gastroenterologist, not a gynecologist, but I do... A lot of the patients I see have these problems, so we'll often recommend lactobacillus suppositories and also recommend a diet to them that's designed really to help to balance things, and also to look at what they're doing, sometimes women are doing things like douching and things like that, that can really disrupt the lactobacillus. So again, sabotaging an innate host defense that they're unaware of. So, we want people to understand how to maintain the sense of balance within not just our gut but within all these different ecosystems of the body, the skin, the vagina, etcetera.

SHAWN STEVENSON: Right, that just reminds me of the marketing of feminine care products that are not really based on science but based on this perception of cleanliness, if you do this particular thing and really disrupting this... Again, we think about the microbiome of the gut, the vaginal microbiome, we have a skin microbiome, we have a microbiome of our lungs, this is so powerful, but we haphazardly disrupt...

DR. ROBYNNE CHUTKAN: It's this Victorian sense of cleanliness and purity. And I remind people, I'm like it's not supposed to smell a Summer's Eve, it's not. It's not what it's supposed to.

SHAWN STEVENSON: What is Summer's Eve?

DR. ROBYNNE CHUTKAN: Yeah, it's amazing. A lot of this stuff does sort of date back to this Victorian sense of our bodies being dirty and needing to be cleansed, and our GI tract, our vaginas, they're self-cleaning ovens, they don't need to be cleansed, they're doing their thing, and the kidneys... So, I do get a lot of questions in my practice about cleansing and so on, and I remind people that if they're doing it right with getting a little dirt, sweat vag in on a regular basis, you don't need cleansing because again, it's not dirty, all those bacteria, the stool, all of it, it serves a purpose.

SHAWN STEVENSON: Yeah. This is so remarkable. We got a quick break coming up, we'll be right back. The importance of vitamin C cannot be overstated. The big issue today is its simplicity, something so simple cannot be so effective, can it? Well, vitamins C is obviously a major part of our immune system function and how it does its work. And this is the key, is that it helps to reduce infection-oriented inflammation. A recent study cited in the journal, PharmaNutrition investigated the impact of vitamin C in relation to the cytokine activity associated with COVID-19 and found that vitamin C is effective by inhibiting the production, the cytokine storm. Several clinical studies are now affirming that timely administration of vitamin C can dramatically influence the outcome of COVID-19 infections, and this simply has not been talked about but we're going to change that. Now, it's important to also know that all vitamin C is not created equal. You got synthetic forms of vitamin C and we got botanical,

real food-based vitamin C. A study published in the Journal of Cardiology had 20 male smokers consume the number one source, the highest botanical source of vitamin C found in camu camu berry over the course of a one-week study, and it led to significantly lowered oxidative stress and inflammatory biomarkers, and they were measuring this by utilizing C-reactive protein.

Now, here's the rub, the camu camu berry was not just put up against a placebo, it wasn't put up against nothing, it was put up against synthetic versions of vitamin C, it was just an ordinary vitamin C tablet which you might find as you're checking out the cash register or at a gas station, something of the like, and here's what they found. The researchers saw no change in these biomarkers reducing inflammation and oxidative stress in the placebo group. That placebo group again was a synthetic version of vitamin C. For the researchers, this indicated that the combination of other antioxidants from the camu camu berries had a more powerful antioxidant effect in standard vitamin C products alone. This is why I utilize camu camu berry combined with amla berry, combined with acerola cherry, the three highest botanical sources of vitamin C ever discovered in my favorite vitamin C supplement of all time, the Essential C Complex from Paleovalley. Go to Paleovalley.com/model, you're going to get 15% off the incredible Essential C Formula. Go to P-A-L-E-O-V-A-L-L-E-Y.com/model, a special 15% off right now. Vitamin C is of the utmost important our sourcing matters more than ever. Get the very best, not the third best, not the fifth best, not the 100th best, get the very best vitamin C possible, that's going to be in the Essential C Complex on Paleovalley. Go to Paleovalley.com/model. Now, back to the show.

You just mentioned the body has all of these self-cleaning mechanisms, but the most valuable and potent form of cleansing is exposure to sunlight and sweating, as you just mentioned, high quality foods, hydration, all these inputs that our genes expect from us that are oftentimes dysfunctional or even deficient for the average person, then we try to treat it with these different things externally, and so this gets into the conversation with you... This is the same with the microbiome as even the microbiomes in other place of our body, you mentioned how a diet, how our diet can help shift these things, so with that being said, has our diet, and we both know the answer to this, caused... Is it a causative agent in our rampant issues of dysbiosis?

DR. ROBYNNE CHUTKAN: It is the most significant factor in adults for sure. I mean, of course, in the first thousand years of life when the microbiome... Thousand days of life, when the microbiome is really still forming, there are other things that can be really critical like antibiotics and other environmental exposures. But as adults our microbiome is fairly stable the diet is key. And the interesting thing about this, Shawn, and we've talked about this before, is that the foundations for this stuff are laid down pretty early, and that's a Leonetti study. I think we may have talked about it before, but let me bring it up again, 'cause it's a really

important study done by Dr. Paolo Leonetti, who's a Pediatric Gastroenterologist in Florence, Italy. So, he looked at two groups of kids. He looked at a group of kids from Florence, Italy and a group of kids in Boulpon, Burkina Faso, a part of Africa where they're still living very similar to how their neolithic ancestors lived with a lot of gathering and hunting and the food they're eating is grown right there within the village.

And he looked at two sets of kids who were vaginally born and breastfed, 'cause those are two factors that can affect the microbiome, right? And he found that as infants, these two groups were remarkably similar, almost identical, but as soon as the babies graduated to table food, everything changed. So, in Florence, Italy, the kids were eating very similar to a standard American diet. I mean, the reality is that very few people are eating a Mediterranean diet in Italy anymore. So, they were eating high fat, high sugar, high animal protein, low fiber. The kids in Burkina Faso were eating sorghum, a grain and millet and they would make it into a paste and eat it with vegetables. They were eating a super high fiber diet locally grown. They were eating animal protein in the form of occasional termites during the rainy season, and free-range chicken running around the village that would sometimes end up in somebody's pot, but they were eating a very high fiber diet.

And what they found was that the kids in Florence had a lot of species that were associated with diarrheal illness, obesity, etcetera. They had half the levels of short-chain fatty acid, something I know we're going to get into. And short-chain fatty acids are incredibly important, not just for the health of the gut lining, but also for the health of the immune system, they had half the levels. And the kids in Burkina Faso had the species associated with leanness, with health and double the levels of short-chain fatty acids. Now, the really key thing about this study is that neither group of kids were sick, these were essentially infants, they were healthy, but you could see in Italian kids, the foundation for disease had already been laid down microbially with what they were eating. They were already set up for disease, and we look at rates of heart disease in Italy, they're higher than rates of heart disease even in the US, right?

So, we know that this stuff is not born, it's made, and we know how to unmake it, but we have to pay attention to it, and we have to have more of a public health initiative from our government to say that this is important.

SHAWN STEVENSON: Yeah, of course. You know, one of the places that precluded United States pandemic was Italy. And so, I was staying on top of the data, I was watching live broadcasts with the health minister there, and it was dubbed. And one of the things that he pointed out was 88% of folks who were being hospitalized had at least one pre-existing chronic disease in Italy, and somewhere around 50% had two or more. And I was just like, wow, this is... Again, this isn't something that's indiscriminate, we've really got to focus on getting our citizens more resilient.

DR. ROBYNNE CHUTKAN: And we saw similar data from when they looked at the main cohort of people hospitalized in New York early on, I think the statistics were very similar.

SHAWN STEVENSON: Yup, nearly.

DR. ROBYNNE CHUTKAN: And again, this is not victim-blaming, this is, let us help people understand so that they can be more resilient, and this cannot happen again, or at least not to the same degree. And that duality of what it means to examine how we're living and what's happening as a result of it is critical, because otherwise, all we're left with is a ventilator and medication after the horse has already left the barn.

SHAWN STEVENSON: Yeah, you just said it, provide that education, and also if we want to blame something, blame the systems that enable or kind of fortify all of this disease prevalence. I'm coming from low-income community where I'm just inundated with low quality food everywhere that I turn. And I didn't know that there was a difference. I just thought it was just stuff that you ate, I didn't know anything about the makeup of food and fiber and any of these other terms, it's just stuff to eat. But today it's not just relegated to low-income communities, but it is worse there. The average American's diet today is 60% ultra-processed foods. Things that have no resemblance of anything that's real anymore, and this makes up the majority of our diet today. And it isn't just uniquely an American issue, but we're kind of the king of it still and is filtering its way into...

DR. ROBYNNE CHUTKAN: Number one.

SHAWN STEVENSON: Yeah, we're number one.

DR. ROBYNNE CHUTKAN: And Shawn, I'm sure you saw that recent study about the link between ultra-processed food and colon cancer, and it showed up primarily in men, but undoubtedly this is true in women also. And there've been studies looking at emulsifiers in food and risks to chronic autoimmune diseases like Crohn's disease. So again, we want people to know this stuff is not an accident. Sometimes literally some bad stuff just falls out of the sky into our laps, right? That does happen. But again, predictable, preventable, or at least forecastable, and reducible.

SHAWN STEVENSON: Let's talk about another one of these host defenses, so we talked about stomach acid, so important, but you talked about something... And the way that you articulated in the book was so fascinating. Mucus of all things. Again, we just think it's another one of those dirty words.

DR. ROBYNNE CHUTKAN: Good old snot. And what's funny, when I was going into GI, I had a couple of friends who were going into pulmonology, being lung doctors, and I was like, oh my God, snot is so gross. And they were like, are you really a gastroenterologist dealing with stool, telling us that snot is gross? So, there is all this sort of battling about, which is grosser snot or stool. And now, as it turns out, they're both really important, right? I mean, again, these things... You think snot is something nasty, you should blow out or suppress. So let me tell you about mucus. First thing that I want people to know is that most of the mucus in our body, the overwhelming majority comes from our GI tract. About one and a half liters a day are made in our gut. So, it doesn't come from our head or lungs, primarily from our gut.

And one of the main functions is a lubricant, right? So, the mucus lines the gut, so that as the products of digestion move through, it can have nice smooth transit, it also provides a set of sticky lubricant matrix that lines things and that provides kind of a buffer for things like viruses and toxins to reach that inner lining, right? They have to wade through this gel. So, mucus is like this cross between jello and glue, and it is a sticky matrix that traps pollutants and allergens and pathogens, so it can trap pollen and things and smoke, but also viruses. So, the mucus ensnares the virus in the sticky matrix, and then the cilia in the lungs work to move it up and out, and then you either spit it out or you swallow it.

And if you swallow it, that's fine, 'cause then your stomach acid is going to do its thing and denature it. So, not only is mucus physically trapping the virus, but mucus also has proteins in it called mucins. And these mucins have enzymes that can degrade viruses and again, render them inactive. So, it's a double whammy, right? It physically traps it, and then the enzymes work on it, it's like a spider web and degrade it. So, if you have good quality mucus, if you stay hydrated... Let me take a sip in honor of the mucus. You stay hydrated, you have nice healthy mucus, you don't smoke, you get some fresh air, you eat a healthy diet, all these different things, you have good quality mucus, and your mucus is able to work for you. If you're a smoker, you don't hydrate well, the quality of the air isn't so good where you are, unfortunately, that's not one that people can necessarily do something about, but there are other things that you can. That can really make a difference.

But the biggest issue is, again, people sabotaging this by taking a cough suppressive. And so, if you have extra mucus, runny nose, etcetera, when you have a cold, it's because your body is fighting something. It is producing that extra mucus to try and trap that. That's why with allergies too with the pollen, your nose will run, because you're producing more mucus to trap the pollen to get rid of it, to clear it from your body. But what do people do? They don't understand that, and so they take a cough suppressant, they take an antihistamine, they take something to dry out the mucus, and now they are left defenseless in terms of that particular important defense. So, the American Academy of Pediatrics does not recommend. They

recommend explicitly against using cough suppressants in kids when they have respiratory illnesses, but that should apply to adults also, right? And older children...

SHAWN STEVENSON: Most people don't know that.

DR. ROBYNNE CHUTKAN: Is that... And then people say, well, what am I supposed to do? Well, I have 10 things for you to do in the book that you can do to help with symptoms, 'cause the goal isn't just suffer, right? Where I come from in Jamaica, we always say a little sufferation is good, but the goal isn't like just suck it up, there's nothing you can do. There's a lot you can do, but you want to do things without sabotaging this major innate host defense, right? And let the mucus flow. And what's fascinating, Shawn, and it's fascinating when we think about what's going on with the opiate epidemic, the opioid epidemic, is that if you look back at the 1800s, like in 1843, Mrs. Winslow's Soothing Syrup and Bayer's first cough suppressant. Bayer's product had heroin in it.

Mrs. Winslow's soothing syrup had morphine in it. So, these were great at getting kids to stop coughing, but sometimes the kids never woke up. These things from over a hundred years ago had narcotics in them. And some of these things continued to have narcotics in them until really the early '70s. So, beyond the issue of it's going to suppress your mucus and you're not going to be able to trap and expel the virus, you have to think about what else is in this stuff and what is it potentially doing to us?

SHAWN STEVENSON: It's still happening today. People are buying cough syrup with the purpose of finding a high. You know, the psychoactive components to it is so crazy, because again, morphine, heroin packaged up in different ways today, the opioid epidemic, which on that list from BMC Medicine of those three most identified prescription medications that are leading to poor outcomes from COVID. Number one was antipsychotics; number two was proton pump inhibitors. Number three was opioids. So, we're still doing a lot of the same... It's just packaged up differently, and this is getting back to... I love the fact that you mentioned even when we have a cough, it is your body's intelligence, it's working towards an adaptation from that exposure. And this is something that makes us human, it makes us more resilient as time has gone on, but we forget that. And you even mentioned in the book, this is something that we talked about earlier on, the human genome, mapping that out, we find that upwards of 10%, eight to 10% of the human genome itself is viral.

DR. ROBYNNE CHUTKAN: Is viral.

SHAWN STEVENSON: As we've evolved and adapted to this exposure and it's going to continue happening, but it's getting ourselves to a place where we understand and identify these symptoms as these adaptation responses, as our bodies are kind of taking on this new

sampling, new data and figuring out ways to be more resilient in the environment. But I got to mention this because allergies, you said allergies earlier, and we think... Again, we have this innate susceptibility where I looked this up reading your book. This was from the CDC. Alright, the CDC found that food allergies in children... Because again, so much of this is new. It just happened within the last couple of decades. Food allergies in children have increased approximately 50% from 1997 to 2011. Something has happened making us more susceptible to the environment, whether it's food, whether it's allergens, we are not the same species.

DR. ROBYNNE CHUTKAN: It's a couple of things, and I think when you look at that number, it is both externally, the food is different, right? There's a lot of edible food, like substances being marketed as food, but we are also different, because our microbiome is different. And if we look at the... And I want to circle back to the point you made about the viral DNA too, but I do want to make this point. If we look at what's going on externally in the environment with climate change, etcetera, and deforestation and overfishing, you're literally in the ocean and you don't see any fish. And you look at all the trees being cut down. We are seeing the exact same thing going on in our microbiome, we have a third less of microbial species than people like the Hadza tribe, our brothers, and sisters in Tanzania or in the Amazon. And of course, in Amazon and in Tanzania, their habitat is at risk. The environment they live in, that they've relied on for millennia to hunt and fish, etcetera, is under threat.

When you look at the aluminum production, bauxite in South America and these red rivers it's created and how it's destroyed the fishing industry, etcetera. So, it's all at risk, and they are facing a whole different set of diseases now as a result of that, right? And the same thing. So internally, we are different, we are changing our internal landscape, not for the better, not for the better. So, we have to think about that, and as a result, we are seeing allergies, autoimmune diseases, etcetera. But to go back to the great point you made about the viral and 10%... Up to 8% to 10% of our DNA being virally derived. When a virus is just genetic material, it's not really alive on its own, but when it infects a cell, it inserts the genetic material into the cell, hijacks the cell's machinery, gets the cell to start replicating. It's the original gangster these viruses, gets the cell to start replicating its viral material.

If it infects a sperm or a gamete, reproductive organ cells, it then gets into our DNA, becomes part of the reproductive process. And some of these viral proteins are responsible for really important functions, like a placental protein that are involved in reproduction, proteins that encode memory. There are viral proteins that make us immune to viruses like... To other viruses like HIV, to bubonic plague, to all kinds of things. So, we look at Herpes Simplex virus. Mice infected with herpes simplex virus are more resistant to bubonic plague. Bacterial infection caused by Yersinia pestis, and so are humans. Now, fortunately, Bubonic plague is not something, knock wood, that we have to worry about at the moment, but it just shows this sort of adaptive evolutionary advantage that exposure to some of these viruses can provide.

SHAWN STEVENSON: Yeah. Oh, I love this. So, of course, the most important part of your book, you've got the education component, but also what can we do proactively, what are some of the steps that we can take? Because there are really three major sections in the book, part two focuses on what goes wrong, how all this stuff came to be, and part three of the book, you have the anti-viral gut plan, and you talk about building up your body is one of the highlighted things. Securing your defenses. So, let's talk just a little bit about that, give people a brief insight into some of the dos and don'ts for us to support our microbiome, our gut health and just to become more resilient moving forward.

DR. ROBYNNE CHUTKAN: Sure. And I will say, when I wrote my first book, Gut Bliss, back in 2013, I wasn't even writing a plan, it was really my team at Avery that said, people want to know what to do. This information is great, but what to do? So, there was a plan, and then second book, The Microbiome Solution is a bigger plan. This book, The Plan is... It's part three, but it's almost half the book. This book, I really... Finally, I'm like, I get it, people want to know what to do, and I had so much fun with the plan, Shawn, being really sort of creative about work arounds. So, the food part is maybe the most obvious part, right? Explaining what are the things. But the nice thing about it, it's less about what you shouldn't be eating, and it's all about what you need to add in, add in a tablespoon of a fermented food like sauerkraut, just a tablespoon, about 10 grams is going to give you up to 28 different bacterial strains that are all doing really important things.

So, it's like a live... It's living food, medicinal food. So, the food one is maybe the most obvious, but if you think about the sleep one, and of course you're the sleep master, right? But I did make the connection for people between sleep and the gut. Because as you know, Shawn, serotonin, the feel-good hormone is made primarily in the gut, and serotonin is a precursor hormone to melatonin that you need to sleep. So, there is this incredible connection between what's going on in the gut and sleep and the neurotransmitters so the gut-brain axis, etcetera. So, I had a lot of fun coming up with, Okay, here are some things that you can do. And you'll see that melatonin is in there, I talk about it, but it's way down towards the bottom of the list, right? It's divided into different sections about your environment, and habits, etcetera.

And then at the bottom, okay, here's some sort of medical supplement type things. Environmental things, that open air factor, that's something that people don't talk about. This is something we know from back a hundred years ago, the Spanish Flu epidemic. Ironically, with military personnel, the officers were often given a bed inside the hospital to recuperate, and the enlisted men were put on little cots outside, like you know, you're just an enlisted guy, you're just going to be on a cot outside. Well, there was a huge difference in the mortality rate. The people recuperating inside had up to a 40% mortality rate in some instances, and outside 13%. And the reason for that was what is called the open-air factor, OAF, which is defined as a

germicidal constituent in open air. This is different from sunlight and vitamin D, that can be toxic to viruses and some other pathogens.

So, there are tips in there for okay, even if you can't get outside and you know, do some forest bathing, and walk in the woods, you can literally open your car window, bringing some outdoor air in, that can make a difference. You can poke your head out the window, sit on the roof, you know, step outside on a balcony, that kind of thing. Exposure to soil microbes, literally putting your hand in dirt, profound impact on what's going on with your microbiome. So, some of these environmental things are really important also. So it is, as you said, it's divided up into sort of building up the body and also giving people really detailed information, for example, if you're on a proton pump inhibitor, here's a schedule for how to taper off and here's some tips to help you. Now, of course, people need to do that in conjunction with their healthcare provider, right?

But really step-by-step detailed information. The medication section is the one that I'm really the proudest of, because I tell people, these are the medications that are problematic, but I don't just say, don't take these medications, I say, here's what you should ask your doctor about what you could take instead, including alternate day dosages, different form of this medication that will still be an inflammatory, but isn't going to be as toxic to your gut microbes. And then, here are possible substitutions. So, I give people literally a checklist with detailed information that they can take into their doctor's office and say, Well, I'm on this, what about that? And I do that for all the different medications. Because again... And I was wary about it 'cause I'm like, I don't want to be giving really prescriptive advice to people. I'm not their doctor. But I realized people need the information to have that conversation with their doctor, right?

SHAWN STEVENSON: Yes.

DR. **DR. ROBYNNE CHUTKAN:** And so, I wanted to make that really easy for people in the book are, what are the different things that you could do instead? And it's amazing how much of the time... 'Cause I do this with my patients. They may be being prescribed something, maybe their rheumatologist has them on a high dose of ibuprofen or something for joint pain. And I'll say, this is what I want you to ask them. And they go and ask them, and the doctor's like, Oh yeah, sure. And then they come back mad to me saying, why didn't they do that in the first place? And I'm like, I don't know. But they're doing it now, so I want people to have that dialogue. It shouldn't be a monologue, if you go to see a doctor and they're just talking at you and it's not a conversation, and you're really not able to exchange ideas and information with them and get their opinion and feedback, you need to find a new doctor.

SHAWN STEVENSON: This book is so important. And like I said earlier, there's nothing more powerful than an idea whose time has come and getting this education into more people's

hands. You just mentioned just a few things, like the association with the microbiome improving, with just interacting with nature, with open air, with getting our hands into the dirt, that's information. It's not just the thing. All of these things are... These are microbiome inputs of data.

DR. ROBYNNE CHUTKAN: Yes.

SHAWN STEVENSON: And even the sun, the sun is the most powerful natural virucide in the environment by far, so powerful, but are these things normalized in our culture and for the most part, absolutely not. We've shunned the sun; we're hiding out most of the time. But there's a revolution taking place, and you're one of those people truly who are the face of this revolution getting us empowered and educated, and I'm so grateful for that. And by the way, right now, we want to make this book a massive best seller to get this information out there and into more people's hands. You can pre-order the book right now and get an absolutely incredible amount of bonuses by going to theantiviralgut.com/bonus. That's the antiviralgut.com/bonus. And you've got some wonderful pre-order gifts for everybody?

DR. ROBYNNE CHUTKAN: I do, I have an incredible Anti-Viral Gut meal plan with recipes. I have a special citation reference that goes deep into the science explaining each article and really breaking it down in terms of what it means. I have an antiviralgut.com live course with me that's coming up, so lots of stuff for our listeners. And I can't thank you enough for this. I feel like this is an important book, because my goal as a physician, as a fellow human being, I want us all to be healthy hosts. That's the goal.

SHAWN STEVENSON: Ah, I appreciate you so much. Truly. So again, that's theantiviralgut.com/bonus. You'll be able to get the book anywhere that you like, Amazon, Barnes & Noble. But pre-order it today, so that we can create this momentum when the book hits and make it a huge, huge best seller and help to shift this conversation to things that are more empowering. Dr. Robynne Chutkan, you are one of my favorite people. Truly, I'm grateful that you got the chance to actually come and sit here with me. I really appreciate it.

DR. ROBYNNE CHUTKAN: This was such a thrill. And I want to thank you also just on behalf of being a listener, for all the great information that you put out there, you are really moving the needle for people's health, and I thank you for that.

SHAWN STEVENSON: Thank you, I receive that. Thank you so much. Dr. Robynne Chutkan everybody. Thank you so much for tuning in to the show today, I hope you got a lot of value out of this. This is all about education and empowerment. We've got to get our citizens healthier and more resilient starting now. And it starts with us taking care of ourselves, our own inner terrain, and also helping to support and educate our family members as well. We

can change this. We can create conditions where we're stacking things in our favor rather than against us. Well, we got to start taking action. Please go get a copy right now, pre-order Robynne 's book, it is so important, it is so wonderfully written, it's just packed with valuable information. I'm so grateful that she had the audacity and took the time to put her knowledge base into this book and to address something that is so prevalent, and is so needed, which is the most important part of this conversation, which is, how did this happen in the first place? And what can we do to make sure that we are resistant against things like this moving forward? Go to theantiviralgut.com/bonus. That's T-H-E-A-N-T-I-V-I-R-A-L-G-U-T.com/bonus pre-order the book.

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