

Your Microbiome May be Misbehaving – Naveen Jain - #612

Announcer: Bulletproof Radio, A State of High Performance.

Dave: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day comes from 1966, the Journal of Lipid Research published an article that I referenced in a couple of my books. And it was a really cool study because they looked at institutionalized men, and they said, "We're just going to change their diet for five years. And they'll all sign up voluntarily for this, and we'll have pretty good control over what they eat and what they don't eat," which is pretty cool, and something that you really couldn't get away with today. And what they found amongst other things, was that, it takes about 680 days to replace half the fats in your body. So, we're talking about the turnover of cell membrane lipids. And as you'll recall from lots of different books from blog posts, and from different episodes of this, your mitochondria are made of little tiny droplets of fat, the outer layers are, and your cell membranes themselves are that way.

Dave: And the bacteria in your gut, of course, have an influence on that as well. Because, a different study, much more recent than the one in 1966, found an amazing thing. They looked at the type of fat that lines your arteries if you have cardiovascular disease. And lo and behold, it's not the kind of fat that comes from food, whether you're one of those corn oil addicts, or whether you prefer your egg yolks and grass-fed butter. What they found was that, that type of fat that builds up is exclusively made by bacteria in the gut. Now, when you talk to vegan apologist, what you'll find is, they'll say, "Well, that's just one study, it shouldn't be believed," which is scientific nonsense. There's another famous scientist who once said, "Extraordinary claims require extraordinary evidence," which is completely a religious non-scientific statement.

Dave: Any claim requires exactly the same level of scientific evidence as any other claim. Otherwise, it's not science, it's bias. So, what's going on here, is that, what's growing in your gut, and what you put in your mouth, and to certain extent, what you put in your environment that controls what you put in your gut, has a really profound effect on the very makeup of your tissues. But you won't see it over the course of a month, over the course of the three months that they might run a clinical trial on drugs. You might not even see it in a year. You might see 50% of what you're capable of in four years. And since we're talking about turnover of tissues in the body, guess what the collagen half-life in your body is, and you're talking to the guy who made collagen a cool thing. That's why collagen is a category at whole foods right now, is because of the Bulletproof focus on collagen for years as being really important. That half-life is seven years.

Dave: What that means, I've been doing Bulletproof Collagen for 10 years. I've been consuming grass-fed collagen for that amount of time. I've only made half my collagen new, when I'm on a high adequate collagen diet. So, what am I going to look like in another seven years, when I'm 75% new collagen? I don't know, but I hope I look like I'm 18. So, on that note, look at the half-life of turnover of various stuff in your body. We've known some things for a long time, but you don't hear about that on the typical podcast, it takes time. And if you say, "Oh, I'm just going to cheat on weekends, I'll have that cheat day." All bets are off.

Dave: Today's guest is a dear friend, an advisor, a mentor, and someone who is really working hard to change the world on multiple fronts. Multi-guest on the show, author of a book and CEO of a company called Viome, that you know I'm a big fan of, I'm talking about none other than Naveen Jain. Naveen, welcome to the show.

Naveen: Well, Dave, it's always an honor and a pleasure to be on your show, and no wonder I keep coming back.

Dave: I always worry, what if people get tired of hearing from Naveen? But I look at the comments on the blog, and what people say is, "I love hearing from Naveen." So, I'm always inspired just from our normal weekly conversations. But, there's some new science around what's going on in the gut that you've worked to uncover. And some listeners probably haven't heard of Viome, I'm going to briefly describe it, and we're going to get into some new science about how people can change their gut bacteria and know what's going on.

Dave: So, if you don't know about Viome, it is a new company that uses a huge amount-

Naveen: You have to start thing new company there someday.

Dave: Are you still not that new? Wait, three years old?

Naveen: Yeah.

Dave: All right. Three years old is still new. Bulletproof is seven, and people call it a new company. Come on, it's a baby company. Of course, it's your seventh company that's on its way to growing in a big way. So, it's a young company. And I've been searching for 20 years for a way to understand what is going on in my gut. Like, why do I get love handles one day, not the next day? And I have gone to great lengths, Naveen. In fact, I probably never told you this, in about 1998, I swallowed an electrical stimulation device I ordered from Russia. It had just printing and Russian stuff on it. It was the size of a really large pill, and it was made of metal and had two different electrodes. And once it detects water, it turns on and it keeps shocking your gut every five seconds until you pass it, maybe a day or so later.

Dave: So, I took this thing, and it's supposed to increase the strength of the walls of your gut, an increase in [inaudible 00:05:45] peristalsis, right? So, it's in there, and we are, all right, this is weird. Every five seconds, I get a little twinge. And then, when it's somewhere on my left whatever, it's right against the nerve on the front of my hip flexor. So, I'm sitting there in a meeting and it hurts, and every five seconds, I'm kicking, like, my left leg just goes straight up in the air, over and over. How do you explain this to people in the world of cloud computing, when you're just randomly kicking like that? It was like a physical form of Tourette's. And fortunately, I jumped up and down and laid on my side, and I managed to make it move. But that was not how to hack my gut.

Dave: So, what did Viome do? What Viome does, is, they use technology from Los Alamos National Laboratories, that was designed for rapid detection of biowarfare agents. And

as people who knew me 20 years ago, depending what [age 00:06:35] you could classify me as a source of biowarfare agents. And this is one of the many problems that I had going on with my digestive tract. So, Viome says, "Well, let's find out what's going on in there for real." And this is the first company. Holy crab, I've been looking for 20 years for something like this. The first company to be able to say, "Here's not just this broad spectrum, here's the species or whatever." It's going down to very specifics of what species of fungus, bacteria, virus, phage, everything in the gut.

Naveen: I'm going to have to correct you, is not a species, is strains.

Dave: I'm not done yet.

Naveen: Okay.

Dave: Every species and every strain, which is really important. And this is the big thing, every activity they're doing. So, at the end of the day, really, you might not care about the species, because it doesn't give you enough, you might not care that much about the strain. It's what is the strain doing metabolically that is messing with, as we've just learned from the cool fact of the day, messing with what plaque is doing in your body, messing with this inflammatory compound called TMAO. If you have bad bacteria, because you eat industrial processed meat, meat can be bad for you. If you don't have those bacteria, by the way, Naveen, thank you, you confirmed I don't have TAMO bacteria, that means, when you eat meat, it's actually going to be beneficial for you. Well, who would have thought that it all came down to these little guys?

Dave: And no one knew what they did until you did it, and you have this elegant way of saying, "No startup on Earth, even one that you would start, has the ability to do a two billion RND for 20 years, but the government did. So, let's take that and make it useful for us." So, I think, Viome is a big act of service. When you see what's going on in your gut, he was, "Oh, what if it's this one thing I'm eating that feeds the bad guys, and I could just take that out." So, I've used the data from Viome to recognize they had 46 different species of bacteria in the gut. And I took some prebiotics I formulated for bulletproof called Inner Fuel. And in a couple months, I was able to get it up to 196 species in my gut, newsflash.

Dave: Anti-Aging Studies, my new book talks about this, you want more species, a diverse set of species to live a lot longer. Older people have fewer species, and more toxic species. It's hackable, but you have the data, no one else does. And it means, that's a long explanation for it, but that's why this is so cool. Did I get it right?

Naveen: You got it very right. I mean, the interesting thing is that, it's not about having the right answer, it's about asking the right question. So, interestingly, before I started this company, I read thousands of research papers. And it became clear to me that things that we call these chronic diseases, they are nothing but the symptoms of the same thing called low grade chronic inflammation. And that actually primarily comes from your gut organism, the organisms in your gut. What's interesting is, when you learn that fact and seeing that your gut microbiome is responsible for all of these different chronic

diseases, we call them Parkinson's and Alzheimer's and autism and depression and anxiety. We call them obesity and diabetes and autoimmune diseases and cancer and heart disease. But they ultimately comes down to the microbiome. And when I read that, I'm thinking, that's a problem, because that's now in a known fact.

Naveen: Anytime you look at something that is, you can learn in three months, you know, everybody knows this now. And there're a bunch of microbiome company that are doing microbiome test here. So, I must be the dumbest guy thinking that I can do something that is going to be unique and different when it's already known quantity, and people are doing it. And then it occurred to me that all these guys were asking the wrong question. The question they were asking was, what species, what organisms are in the gut? And they thought, once they understood that, the problem will get solved. And I've handled this, that's the wrong question. The right question to ask is, what are these organisms producing? Because, body doesn't care who is doing it, what they care about is what is being done to it. And if you can figure out what these organisms are producing that's being absorbed in the human body, we will be able to actually do something about it. Because then, it becomes math and chemistry. Once you know the biochemical activities of the chemicals that are there, you can adjust those chemicals.

Naveen: Math is simply about using AI to understand what to modulate, that's easy.

Dave: It's like, if you had a shopping mall, say, we have a problem with theft. All right, here's what we're going to do, we're going to quantify everyone who walks in the door, and we're going to understand where all these people are from. We're going to know how many people with what percentage of their DNA are from India, versus Northern European ancestry, versus all these things. And look, we totally know the mix of every person coming into our mall. You might want to know which of them are stealing, because it actually isn't correlated. And then, say, "Okay, what's that? Oh, the people who are in a gang, are the ones who are stealing," or whatever the thing is, right? So, what we have a history of doing is, we measure what's easy to measure, and then decide that must be the problem. Cholesterol being the number one, "Oh, yeah, we can measure that easily because it's the yellow layer when we spin blood, therefore, it must be at fault, because we can measure."

Dave: But they didn't know what an inflammatory cytokine was, for instance. They didn't know any of the stuff we know today. They couldn't even spell mitochondria when they learned how to spell cholesterol, right? Because they hadn't been identified yet. So, all of this stuff we keep going down even back then. Somehow, we were distinct from our bacteria. You broke that rule, you asked the right question, what is the behavior of these things like this? What is the most surprising thing that you've found at Viome so far? Before you do that, how many data points, how many tests have you conducted so far that's public?

Naveen: We have now over 100,000. But here's the interesting part, we are now adding 10 to 20,000 new people every single month. And what it's really allowing us to do, is to learn about the human body at a level unprecedented, unprecedented, right? And the things we are learning are absolutely rewriting the books or what we thought was possible. So, we always divided the food into, there is carbs, and there're protein, there is fat.

Dave: That's a useless breakdown.

Naveen: But here's a very interesting thing. What we learn is, these organisms in your gut are able to take one set of molecules, and chemically transform them into completely different molecules. For example, they can take a starch, convert them into branched-chain amino acids. Who would have ever thunk that you could take a carb and turn them into precursor two protein. I mean, that's just completely mind boggling, right? The other fact that we learned was that we always thought the hormones like estrogen or testosterone are produced by the human body. Little that we know that these little critters are actually producing testosterone and estrogen.

Dave: Wait, so, I new mitochondria directly produce those, which are ancient bacterial [inaudible 00:13:41] cells, in addition to what your saying.

Naveen: That's my point.

Dave: Your adrenal glands do, a lot of people don't know that. And then, of course, you're going to always do that. But, in women, it's actually just the adrenals, ovaries don't make testosterone. But, does that mean you could formulate a probiotic that raises testosterone?

Naveen: Oh, not. Interestingly, I want to just [crosstalk 00:13:59] the myth away from the idea of organisms, right? So, it's not about a single organism doing something or set, it's about the network effect. And I don't think people understand. You say, ecosystem is not the good versus the bad, it is a good ecosystem versus the bad ecosystem. And what is that thing very interesting is, same organisms can produce, it metabolize one thing and synthesize one thing, when it's all by itself. And it changes it's behavior when you put it part of the ecosystem. It produces something totally different, and it actually metabolizes something totally different.

Dave: Naveen, you can't say that. If you do that, you're going to [inaudible 00:14:41] the entire drug industry, which is based on testing a single variable and removing everything else. And you're saying that life is dependent on more than one variable at the same time? I mean...

Naveen: Well, Dave, you're being really sarcastic because you and I both read the same research that came out last week, but here's very interesting research, right? They looked at the drugs, and these drugs are FDA approved, and they give the same drug to everyone. And it turns out, whether the drug works or does not work, depends on your gut microbiome. Because, when you pop that pill, what happens to it? It goes to your gut, and these organisms can take one molecule and actually turn them into totally different molecule. It can be actually toxic and may be harmful to you, or it can detoxify it, makes it ineffective. Or, it can amplify it and kill you.

Dave: What this means, is that, every single double blind placebo controlled study on Earth, where they've said in big letters, "We controlled all variables," it's BS. They did not

control for the bacterial composition of the stomach, and now we have 100,000 different samples saying, "Hey, guys, that mattered."

Naveen: Well, not mattered, that's an interesting point. They controlled, so, if you look at the human body, right? Our human DNA produces about 20,000 genes, right? Are these gut organisms which are 40 trillion of them, so, they didn't miss one or two here, 40 trillion of them, they produce about three million genes. That means, at most, we are 1% human, more than 99% of all that stuff is actually these gut organism. So, when they say, "We controlled it," they missed 99% of the human body. It's not controlled.

Dave: They also, when they were doing the animal studies, they didn't look at what was in the mouse poop. They also forgot this little fact that, it turns out, the way mice behave, even the hormones, they secrete changes radically based on whether a woman feeds them versus a man. Oops.

Naveen: Yeah. I think it's very interesting that, they somehow believe that what happens for rats, happen for a human. And I know many women think the men are just rats, and some are probably are, but not all men are rats.

Dave: That's a fair point. And there are some metabolic similarities between yeast and rats and people and all, and is good for directional understanding. But it's complex enough that it requires artificial intelligence and machine learning and big data and huge sample sizes, which is something that drug companies don't typically get, and something that we're never going to get, when it comes to nutritional composition. Like to sample, what does the country eat? You get these junk studies like the DASH study, and all these studies of, "I don't know, we asked these people once a month to remember what they ate the month before and tell us, and then we're going to tell the world how to eat based on that." And it's all rubbish, there's no good science, if the data you're basing on is not good. But what you've done with Viome is, you're saying, "Well, here's some real data," and one of the reasons I wanted to have you on the show, was just to talk about, with that amount of data, tell me what you learned about what bacteria do for blood sugar, specifically.

Naveen: Oh my God. So, it's very, very interesting. This is a recent research that we published, it's amazing. So, people talk about the food really being having a glycemic response, like, "Oh my God, I ate bread and it's going to have an effect." What we learned was, it's not just the food, but actually what your microbes do with that. And we saw two people eating exactly the same wheat bread. And one of them would glycemic response will shoot through the roof, other one barely moves. And the same two people may have completely different response to almonds, even though we have this something called average glycemic response. Newsflash, no human being is average, right? They all are very different. So, point is, the glycemic response what we learned were just by analyzing your gut, very precisely, your poop. We never touched the blood, but we can predict with 90% accuracy, the response of that glucose in your blood just by looking at your gut.

Dave: You can predict the response for any of the normal foods that you have in your study?

Naveen: That's right.

Dave: So, you can-

Naveen: 27,000 different foods.

Dave: So, you can basically say, based on what's in your gut today, and that may shift over time, if you eat the right stuff, that these foods are going to cause a blood sugar spiking crash for you only.

Naveen: Yes.

Dave: And that is really fascinating, because if you were to go back even just 10 years ago, right before I started writing for Bulletproof, there were a huge number of doctors out there who would say, "That did not happen to your blood sugar, because it can't happen, because we know the glycemic response." And you're saying, "But, I stick my finger, and the science tells me that, I do this, and it happens over and over and over, therefore, that's real." And it's not real, it can be, it's on your mind. And you're like... But now you're saying it's on your gut.

Naveen: But here is very interesting, another thing, the cool fact that you talk about, yesterday, they published a study which I think people are going to now completely look at the world differently. Everyone believed, the baby inside the mother's womb is in the sterile environment, right? It turns out, they looked at the people who went through without any water breakage, they had to go through emergency C-section. And they looked at the amniotic fluid, placenta, and the baby's [macquarium 00:20:22]. And it turns out, every one of them had the bacterial organism. That means, even the baby inside the mother's womb is exposed to the mother's microbiome. And then, the second study was published, how mother's microbiome during pregnancy impacts the child, not just for autism, but also many of these chronic diseases. Imagine that.

Naveen: They found, another interesting fact that you will learn is, mother's breast milk is completely different, whether it is pumped, or actually, directly being fed to the baby.

Dave: And what's the difference there?

Naveen: So, difference actually is that, how, when baby is actually directly drinking the milk, not only the mother's, the skin microbiome, obviously, is impacted, but also the way during the sucking, how the oral microbiome actually gets into digested into the gut. And worse is the pumped milk, when you're drinking it from a bottle.

Dave: I have come to believe that we are essentially walking, either Petri dishes or bags of compost. And the reason for that is, in part, what you've just said. The other one is another study just came out, and they can finally look in the living cells with high-resolution microscopes, and we haven't been able to do this since sometime in the 20s, there was a guy who figured out how to do it. And then, surprisingly, what was his name? Morris Fishbein, if I remember right, the founder of the American Medical

Association, went and destroyed all five microscopes that could do that when he couldn't buy them. A true story, by the way, you can Google that. If it's on Google, it's obviously true.

Dave: Anyway, I digress there, but what they're finding now in the latest studies on the brain, is they're saying, "Oh my God, in healthy people, there are bacteria inside the blood brain barrier, doing stuff in cells, and we never noticed them before, but we think they might matter."

Naveen: Brain microbiome?

Dave: Yeah.

Naveen: And here's interesting one. Most people thought that even our immune system actually stops at the blood brain barrier. Now they found the immune system all the way to the brain.

Dave: The glymphatic system, yeah.

Naveen: The lymphatic system, and also the communication between the bacterial organisms in the gut to the brain, interesting part, here's interesting part, what happens in the gut, doesn't stay in the gut. When you are anxious, you get the butterflies in the stomach. When you're depressed, what do you do? You eat or you don't eat. Why is it, the digestive system is actually impacting the brain? It may turn out that, as you mentioned, that we may be just a wonderful, beautiful container for these microorganisms, for us to spread them around by pooping everywhere, which is literally why they may have created us. And they control our mood, our behavior and our craving, which I found to be personally just amazing. I used to crave the desert after every meal, because, to me, it was the exclamation mark, my meal is done.

Dave: I've seen you eat ice cream, Naveen.

Naveen: Yeah, but here's the interesting part, after I gave up for three weeks, just willpower, I just don't crave it anymore. I don't need it. So, what is it that happened? The first three weeks were the willpower. After three weeks, I killed those bastards who were making me crave that. Don't kill them anymore, don't care anymore, right? So, my point is, little that we know, they're controlling every part of our body. They are the puppet masters. And one day, we're going to realize that, I'm going to digress for a second here. We talked about humans having a soul, right? And that's something that's eternal. And when we die, the soul goes away. I wonder if they were really talking about microbiome.

Dave: So, you're saying your soul is made of poop?

Naveen: But, more or less, the microbiome move from one host to another host. And the soul just simply merges into the nature and finds a new host, right?

Dave: I believe the origins of consciousness are bacterial in humans unquestionably. The ego itself is a function of mitochondria, mitochondria bacteria, bacteria talk to each other, the gut, bacteria toxin. That's how we work.

Naveen: So, microbiome mitochondria communicating. The microbiome literally, every bit, everywhere in our body is communicating through the bacterial organism. They were there three and a half billion years ago. They had lot of time to think, a lot of time to evolve. The humans are only couple of hundred thousand years old. We are still learning to communicate among on ourselves.

Dave: I've definitely said this on the stage and probably on air. But, look, 2 billion years ago when multi-celled organisms came around, well, we like to say, well, we harnessed the bacteria. And the bacteria are sitting there, going, "No, no, we found these floating Petri dishes, we moved in and look at all the stuff we built on top of that platform." And they're still in charge today. And people who say, "That can't be, my sense of self just got harmed." I'm like, "Look, look at what you do with most of your time. You run away from scary things, eat everything and have sex with everything else. That's what bacteria do, you're a walking bacterial reproduction system." And being a farmer, Naveen, has taught me so much. Because, soil is essentially what our poop is. It's our internal soil. Since we don't have roots in the ground, we have to carry some around with us.

Dave: Well, I have sheep, and it's really interesting. I also have pigs. So, sheep walk around, and they just poop like machines. They do not care where they poop, they poop everywhere evenly. And their job is to repopulate the soil with healthy bacteria. And when they do that, everything grows abundantly-

Naveen: And they eat.

Dave: Yeah, they eat that. Well, they're vegans. So, now, the pigs, which are omnivorous, they're like, "I'm going to poop in the corner over here." And they'll roll in the mud, and they'll step in their food, and all that kind of stuff. Their job in our giant ecosystem is not to repopulate the soil, their job is actually to clear the soil, which allows grass to grow, which allows the sheep and other cows and things like that to come in and repopulate the soil. So, we have this amazing maintenance system in the world around us. But then, we get into our own guts, and we say, "We're not that, we're not our poop. That's not a part of us, it's just some random thing." But, you're a part of the world around you, and now that I understand how to form healthy soil in a farm, the ability to form healthy soil inside your body is important.

Dave: We destroy soil outside of the human body by spraying glyphosate, which is a patented antibiotic. And so, it can't affect humans because humans aren't bacteria, which is a false statement. So, we're destroying soil on a global basis, it's horrifying. But, destroyed soil outside the body leads to destroyed soil inside the body. Are you seeing healthy microbiomes in most of those hundred thousand samples? Or, are you saying dysfunctional samples?

- Naveen: It's very interesting. It's so difficult to find people who actually are healthy anymore. Because, most people believe, just because they don't see the symptom, they are healthy, right? It's like they don't see the rashes on the skin, but we actually are able to see the rashes inside their gut. We see these inflammation which are rashes, right? And once we see this inflammation, if we can suppress that, guess what? You can prevent the chronic diseases. Even if you have a chronic diseases, immune system, the body's immune system is amazing. It can kill cancer, it can repair itself, only if it's not constantly struggling with what's going on inside your body. So, if you can nurture the soil, which is your gut, and take care of these 40 trillion organisms, so they're providing you with the nutrients, such as vitamins, the vitamin B, vitamin K, or short-chain fatty acid like butyrate, that calms down the immune system.
- Naveen: And not producing things like lipopolysaccharides, ammonia, sulfides, that are actually constantly causing inflammation, you can live healthy.
- Dave: Let's talk first about a couple of those compounds, and then about what inflammation does. Some new science that came out last week. Let's first talk about ammonia. Ammonia is something that anyone who has been on the high protein diet like I tried in the 90s, like all of us did when we were led the wrong way by the standard American diet food pyramid, saying, "Well, these, like, carb-based," and then said, "Well, let's eat high protein. Protein when it ferments, it turns into ammonia. What does ammonia do in the body?
- Naveen: Well, look at what ammonia does at the outside world. Do you think it does any good to the outside world?
- Dave: It's super hard on the liver and kidneys, right? And that's one of the reasons high protein diets are bad for you. There are many, including the fact that getting more than 20% of your calories-
- Naveen: Fermentation of the protein is nasty for your body, nasty. Because the protein fermenters, they're really sulfide. I don't care what anybody say that [inaudible 00:29:28] smell, it's not fun.
- Dave: Yeah. And in fact, anyone who's been in a gym full of bodybuilders knows exactly what Naveen's talking about there, and it happens on a high protein diet. Especially if you're eating junk proteins like milk protein isolate. But, when you've got your protein fermenting in the gut, ammonia gets in there. But one thing ammonia does, it disrupts sleep quality. It's one of the reasons why I formulated the Sleep Mode, the Bulletproof supplement. And guys, yeah, I actually do make supplements that I wanted to take, so, I'm very happy to be able to tell you about it. One of the reasons I put the amino acid or ornithine in there, is ornithine can help the body clear ammonia. And so, funny, if ammonia is your problem, it might be beneficial for you. And if ammonia is not your problem, it's not going to harm you. So, it's that little understanding, but not eating protein to the point that you're growing protein from it, and using it as a building block, not a fuel source, is a fundamentally good thing to do. And you have the data now to show that.

Naveen: And that's exactly what we do, we look at a biochemical level, what is happening inside the gut. And then we say, "You know what? You really need to eat these supplements, to actually reduce the impact of these biochemical that are nasty, or don't eat these foods." So, we have a choice of telling you not to eat the food, or eat other supplements that will minimize the damage from the things that are being done. And then, tell you the foods that actually will be good for you to produce the nutrients, right? So, it's not that broccoli is good for everyone. In fact, this whole idea of kale and spinach being good for everyone, or the pomegranate juice or the blueberry being good for everyone, it turns out, it's just not true. For me, the blueberry is not good, the blackberry is good. For me, the spinach and kale actually cause me harm, because I don't produce enzymes in my gut that detoxify oxalate.

Dave: Wait, did you just say kale could be bad for you, Naveen?

Naveen: Oh my god, I'm going to-

Dave: You've offended the church of kale. You can't say that. They're going to throw salad at you or something.

Naveen: Dave, you offended the church of all the protein high bodybuilder, so, you've got a bigger problem. They're going to come and clobber you.

Dave: I'm going to have to breathe their air in the gym. Now, it's funny. I have for years said, we have a serious problem, especially with raw kale, and these raw kale smoothies are even worse, and it's because of oxalic acid. And in fact, I first announced that on the Joe Rogan show, because he was basically pimping these raw kale smoothies to people. I'm like-

Naveen: So, you're bands now from Joe Rogan.

Dave: There were other commercial reasons for that. But, it was interesting because, obviously, there's listeners to do that. I think he backed off on that, and you became a coffee fan, surprisingly. But, what was really interesting there is, I said, "Guys, you've got to at least cook it and get rid of this oxalic gas, because a lot of people can't handle it. And even if you can handle it, it's probably not good for you." And I went to great lengths to try to grow oxalate eating bacteria [inaudible 00:32:17], one leaf of kale. You know what? Kale still tastes bad, and kale still makes me inflamed, and I get muffin top from it, I get tired, I get sugar cravings. So, if it works for you, it's probably okay. But, I can tell you, when I give it to my sheep, they spit it out, [crosstalk 00:32:30], they're not dumb. Right? But sometimes, you can make it taste good if enough sugar on your kale or bacon.

Dave: Now, okay, that was the oxalic acid thing. And in fact, you have the data that actually proves this thing, going back, five, six years when I was on the Rogan shows still.

Naveen: Question you're asking me, Dave, was, what have you learned new? Right? So, another thing we really learned is, now we can see the signatures of the diseases just by looking

at your gut microbiome, fancy way of saying your poop, we can see the onset of depression, onset of obesity, diabetes, IBS. And then-

Dave: Just from gut bacteria mix.

Naveen: Just from your gut bacteria mix, we can actually tell you, you have IBS, we can tell you, you have joint pains, you got arthritis. And amazing things happen as you adjust through the micronutrients, and micronutrients come in the form of supplements, on possibly even food. And then, you're able to adjust the biochemical activities using artificial intelligence, amazing things happen. Our hope is, in the next five to 10 years, we're going to be sitting here and talking about and saying, "I can't believe there was people 10 years ago who suffered through life. They had cancer and died, they had heart diseases, they didn't know what to do with it." Our kids are going to laugh at us, you mean, people took the drugs for rest of their life because they just didn't know what to do?

Dave: Or everyone ate the same diet? Wouldn't I eat the diet that works for me? It's obvious, right?

Naveen: And mom and dad, by the way, had the same meal. Every day, they sat around the table and ate the same meal. You mean they didn't have the personalized, customized, 3D printed meal just printed for them, and they sat and ate together, however the meals were different for each person? Because is going to be personalized. The idea of these consumer packaged goods, are going to go away. There will be no packaged goods, everything will be on demand, personalized just for you.

Dave: And customized.

Naveen: And customized for you, right? That is what... You are doing amazing stuff, because I really believe, Dave, in the next 10 years, the idea of people having chronic diseases is going to go away. And that's our mission, to create a world, where being sick is truly a matter of choice, not a matter of bad luck. And it will happen. 10 years from now, we won't be discussing this, it doesn't mean we won't have any other problem. Our kids are going to talk about and say, "Why do we have to speak, to actually transfer our thoughts to another person? You mean, you just had such a low bandwidth? You're speaking thing to transfer? You even didn't have a broadband 7G, that just, do everybody understood your thoughts and they were just done? And by the way, you were sat in the class for four years to learn about the thing? You didn't just upload their brain into them and then you were done?"

Dave: The world is going to be so much cooler than it already is. And you can see the slope of change, if you've worked on it for decades, like you have. And if you're new to this, going, "How could even that be possible? I didn't see it last year." It's because things are happening four times faster this year than they were last year.

Naveen: And by the way, people don't understand the power of exponential doubling. People don't see when it's growing. And when it hits the knee of the curve, people say, "Where

did that come from?" And a great example is a 3D printing. People think that 3D printing is something just new that happened in the last four or five years. Now, what most people don't realize is, 3D printing is 35 years old. So much so, that all the printings have expired.

Dave: It was pretty amazing, you and I were together watching at SpaceX, when they 3D printed a rocket engine. That is such an advanced piece of engineering technology. I see it, you came and speak, you're saying, "How did we do that?" And it's happening across every industry, including the stuff you're doing in Viome. By the way, I was supposed to say this at the beginning of the show, but, I am an investor and very early advisor to Viome. So, I do have a financial interest in talking with you Naveen.

Naveen: Dave, you have to know that, I have a interest in just talking to you, because, every time I'm with you, first of all, I feel smarter, I learn so much, and I just enjoy spending time with you. So, there you have it. So, we all self-interest-

Dave: We hang out all the time, but we do get to spend a lot of time. I make sure I go out of my way to say, "Hey, this is a company I believe in enough to put-

Naveen: And by the way, you put your own money it's not like you got something for free.

Dave: No, I wrote a check, because I'm like, "This is going to be big." And so far, you've definitely met that belief that I had. Now, earlier we talked about something called lipopolysaccharides. This has been a massive focus for me when I was dealing with brain fog. So, these are nasty compounds made by gut bacteria, that cross the gut barrier, and cause-

Naveen: Especially, the small molecules.

Dave: The small molecules, right. And then, they surprisingly raise LDL cholesterol on the blood, which will bind to them and help you get rid of them. They increase inflammation throughout the body, the subtle low grade inflammation, and are tied to just about every bad biological outcome that can be possible. What are you finding, with the Viome test, raises lipopolysaccharides the most in people? Is there a common thing you've learned?

Naveen: So, it's very interesting that we see in our app now, that's coming out in the next, physical app. By the time people listen to the episode, this will already be there. We show you the actual production of butyrate, [Patterson 00:38:08], LPS, primary bile acid, secondary bile acid, we just go down and show you all these biochemicals that are being produced. And by the way, here is a food that will help you reduce this, here's a food that will increase your butyrate. Here are the things you need for doing this. And everything is now connected, purely math and chemistry. What we've find is this, LPS and all of the things like ammonia and sulfide, all the things that cause inflammation. In fact, we can even see when the lot of flagella, that means, these bacteria are running away from this environment. They don't like what's going on here. Right? I'm going to just burst another myth, people just somehow think this intermittent fasting or fasting

for three or four days is just good for everyone. It may be good for some people, but anytime when you don't eat for a couple of days here, what happens?

Naveen: Those gut organisms, they get hungry. And they eat what's around them, which is your gut lining. So, they love that mucin, that carbs, that carbs, they love that. They start eating that. And we see these bacteria metabolizing your mucin, which is your gut lining. When you're not eating, you're fighting the evolution. And let me tell you something interesting. Every time you fight evolution, evolution wins. Evolution one, man zero, every time.

Dave: Yeah. But with evolution, certainly included the ability for people to go without food, because it happens quite a lot.

Naveen: It does. But it wasn't like, three, four days. People now fast for three, four days.

Dave: I talked with-

Naveen: Anybody, it works for some people, but I tell you, some people, we see them eating your gut lining [inaudible 00:39:50].

Dave: Oh, yeah. I talked with Dr. Gundry about this, and he's a very well respected cardiologist scientist, robotic surgeon, and overall, hard to say this guy doesn't know what he's talking about. Well, he says that intermittent fasting and fasting is awesome because it encourages the growth of a species called acamancia that lives in the gut lining, that makes new mucus lining. So, the production that's there. But, what I don't know, and I don't think that he knows, is what the right amount of time is. Because, here's what happens-

Naveen: It's different for different people.

Dave: That's the thing.

Naveen: Yes.

Dave: So, I did, in the creation of the Bulletproof Diet, no one put butter in coffee. No one was eating the ratios of fat I was talking about. But, like this is born in the studies I'm reading, I'm just going to try it and see. So, I got to the point where I could effortlessly control my cravings and my weight. And I said, "All right, I'm going to try the Eskimo diet." This is the very early days of keto, before keto was cool, but I wanted to really go all in. So, I ate for three months, only fat and protein and one serving of broccoli a day.

Naveen: The whole serving?

Dave: Yeah, a whole serving of [inaudible 00:41:04].

Naveen: Oh my God.

Dave: So, the idea was-

Naveen: No carbs?

Dave: No carbs at all, and mostly fat. Because, [inaudible 00:41:09] to do this, and I ate lots of fish and whatever else. And what happened was that I developed a host of new food allergies. I started to wake up 12 times a night without knowing it, according to my sleep monitor.

Naveen: High anxiety.

Dave: High anxiety.

Naveen: Hormones got out of balance.

Dave: Yep, I felt hungover all the time. My libido went down. And that was bad news, but I didn't stay thin. And what happened is exactly what you described. I ate through the gut bacteria, I developed-

Naveen: There's church of keto diet people, right?

Dave: There's what?

Naveen: There's church of keto diet people.

Dave: It's right next door to the church of vegan diet. They're actually very, very similar. I call it dirty keto. And that's why the Bulletproof Diet, was this like the first major big book? That was, hey, here's how to use keto strategically. It was, you've got to eat the right fats when you do it, and you go in and out, in and out, and you must eat tons of vegetables to feed your gut bacteria. And when you go out of ketosis, you're preventing this problem of the gut lining.

Naveen: And by the way, those veggies are the ones that have fiber and feeding your acamancia.

Dave: Yes, exactly. And in the issue, of course, we didn't know about acamancia and what it did back then, but you could tell from outcomes what to do with this. But the question I have for you, intermittent fasting for 18 hours a day, that is not going to cause your gut bacteria to eat your gut lining, it'll probably cause a regeneration of it, get like fungus growing on your gut lining. So, you need that. And I think, Dr. Gundry is right there. I mean, that carb, it's why I make a prebiotic for Bulletproof and all that. But, do you know or do you think you'll be able to know from Viome, how often I should intermittent fast? I mean, a 48 hour fast is so amazing. I feel so much better when I do that. Even a three day fast, I'm good. I don't typically do 10 day fast or anything. Were you [inaudible 00:42:55] tell me how long to fast?

Naveen: Absolutely. You can now actually look at the circadian rhythm of your gut microbiome. And it's very interesting that when your circadian rhythm of the gut microbiome goes

off, you have trouble sleeping. So, we're in fact, are doing a clinical trial of insomnia and people who have sleep disorders, or what's happening inside their gut. And with very large, famous medical institute that most people might know, that comes with the M word, but we can't quite say that quite yet.

Dave: It's like a condiment, you might put on a sandwich? [Manis 00:43:31]?

Naveen: Yeah, something like that. That's something like that. Yeah. But something like that. But point is-

Dave: But not ketchup.

Naveen: But my point is, we're doing all these clinical trials now, with large institution, double blind clinical trials, controlling for what the drug companies never did, understanding what's happening in your gut, modulating it, and using the right intervention to be able to reverse, not manage, reverse things like depression, anxiety, autism, we're doing a 5,000 kids trial on autism. We're doing a trial for Parkinson's, we're doing a trial for PTSD with the first responders. Right? And then we're doing a trial for obesity and diabetes and heart disease, and then we're looking at a space in the cancer space, we're doing colorectal cancer, breast cancer, ovarian cancer and pancreatic cancer. Because, there was a research that came out, out of NYU, that showed that how pancreatic cancer is caused by the gut microbiome, moving through the bile duct, getting into pancreas. What did these bacteria learn to do? They learn to control the immune system.

Naveen: Think about it, how are they able to live inside us? Because they tell the immune system, "All good here, leave us alone." When they move to pancreas, what happens? These guys now got a nice good place, got all the food they need in the pancreas. Cancer cells are always growing, cancer cells are always being killed by our immune system. When the bacteria goes there, it tells the immune system to leave everything alone, and the cancer keeps growing. And this researcher saw that, put the anti-microbial thing directly into pancreas, kill the bacteria, next thing, immune system kill the cancer. So, imagine that as we're seeing now, same things are happening in the breast cancer. I believe the Cleveland Clinic and the Mayo Clinic published the research, they looked at 1,600 breast cancer tissue, and find the microbiome in there. Now we started to do the same thing in Alzheimer's. So, if you look at a pathology of the people who had Alzheimer's, they're all seeing the microbiome, massive overload of viruses, and microbiome.

Naveen: And one thing I think most people don't realize, we look at viruses and phages. And the viruses, not just the DNA viruses, but the RNA viruses, and lot of these plant viruses, the RNA viruses, and nobody had paid attention to them. And we're seeing that these raw vegan people they're eating healthy, they're eating all of those viruses. And they, by the way, are causing massive amount of damage to the gut.

Dave: The raw vegan diet, I was really devout on that, before I was forced to go on the Bulletproof path. It trashed me. And I hear this over and over and over, and you hear these real happy 23 year olds full of energy, they're spending way faster than they

should. "Okay, look, my life is so good." And then, they get caught with a picture of them eating fish or an egg, because they're starving. And then, they feel guilty about it. And then they say, "Actually, sorry, it didn't work." And it's a common thing. What do you see amongst the gut bacteria people who are strict vegans or raw vegans?

Naveen: We actually see tons of these plant viruses, and these plant viruses, interesting thing about these viruses are, they're actually able to cross the gut lining without having to have a permeability intake or without a leaky gut, the viruses know how to cross through the cells. And these guys go in the blood, and these do all kinds of inflammation, all right. So, we see the people who are on all of these plants diet, raw vegan diet or the plant diet, we see tons of overload of viruses. In fact, when we look at the people who are sick, and people who are healthy, we see a massive amount of viral overload. By the way, one of the things that nobody has ever paid attention to it, is the bacteriophages. So, I'm going to tell you, in nature, there are 40 times more phages than other organisms.

Dave: Tell me what a phage is? A lot of people don't know what that is.

Naveen: Well, you are the expert. I mean, Russians and Dave Asprey are the expert on bacteriophages.

Dave: How do you know that I'm an expert? But I do know that you call old Russian scientists, if would want to know about phages. Some of whom have the best samples of them in their household freezers for years when they shut research on these down. But these are essentially-

Naveen: Viruses?

Dave: A viruses that eat bacteria.

Naveen: Only, in fact, the bacteria.

Dave: Yeah. So, you can fight bacteria with phages. And the Russian scientists and doctors had actually developed hundreds and hundreds of phage species. So, if you had this bacteria, you take this virus that kills the bacteria. And these are common in soil, they're everywhere. But you just have to know which ones to use. And then, when they lost funding, a lot of times, they're like, "We can't afford the electricity for the labs." So, they just lost decades of work [crosstalk 00:48:18].

Naveen: That would be the best way, instead of taking broad-based antibiotics that kills everything, these phages will be precision missile, that will kill specific set of organisms that is becomes, suddenly becomes pathogen, you can kill that organism as opposed to taking antibiotics. The idea of throwing a nuclear bomb inside your body, is going to completely go away.

Dave: And as someone who spent 15 years on antibiotics, just about every month, because I had these chronic sinus infections, which were caused by the environment around me,

I'm probably still dealing with that. In fact, when I talk with the Viome lead researchers, that, "Yeah, you're showing a pretty darn healthy gut bacteria, but you got a biome, but we can still see that you're someone who had heavy [inaudible 00:49:00] treatment earlier in life. Because it echoes." What I don't know, though, should I be doing a fecal transplant? Are you going to be able to tell someone, "Hey, we have a fecal transplant matching service, this one client over here and in Lithuania, has the perfect poop for you, all you need is going to mail you..." Is it going to happen?

Naveen: The thing is, this microbial transplant or fecal microbiome transplant or fecal matter transplant, this is a very crude way of taking it, right? You take someone else's a whole ecosystem plant inside you. That means, for all practical purposes, you're taking all of the phenotype, and giving yourself. That means, they have depression, tendency to get overweight, all that stuff, now you get. Everything that they have, you get. But here's the worst part, their ecosystem is based on the diet they eat.

Dave: And on their mitochondria-

Naveen: And their mitochondria and the environment, right? Now, you put them in a completely different environment, feed them a completely different thing, that completely changes. So, this idea of Eskimo diet or paleo diet, you remember, yeah, you want to eat like your ancestors? Have your gut microbiome like their ancestors. With that apparently not true, because we kill them all through antibiotics, living in this sterile environment. And suddenly, we have this gut microbiome that does absolutely no good any more, and you can eat like the ancestors without having a gut microbiome of ancestors. And that sucks.

Dave: It really does suck, and this whole, eat like your ancestors thing, or, my favorite, "I'm going to get all my nutrients from my food." Like, You've got to eat the same food your ancestors ate, which was more nutritionally rich, you should have the gut bacteria of your ancestors, and you should only get toxins from mother nature. Or, no glyphosate anyway. Yeah, wait, hold on, none of that exists anymore. So, we've got to adapt to it. But I think, measuring what's going on in the gut the way Viome does, it is critical and crucial step, and I do mine about every three to six months, I'd say. So, my goal is four times a year, but sometimes I'm too lazy to do it. And the reason for that is, I'd like to see what happens over time when I make changes. We talked about inflammation a little bit, but I didn't get to mention the new study that came out. This is a study in computational biology, this just came out very recently.

Dave: And I'm actually going to cover the study on the show coming up here, because it was so fascinating. They figured out that they could look at inflammatory cytokines. So, if your gut bacteria is racked, you have these viruses causing inflammation, or you have lipopolysaccharides, the LPs coming through the gut lining, it'll cause all sorts of inflammatory markers in the body to go up, and you get chronic low grade inflammation, just like I lived with for many years. Well, what they found is, they could look at the type and abundance of inflammatory markers in the body, and accurately predict depression. And, this is what's cool about it, they found out that those cytokines caused the body to automatically down regulate dopamine production. Now-

Naveen: Actually, it's very interesting study, I can give you even better than that. So, what we see is, the people who have depression, the same tryptophan pathway that we're all familiar with, the tryptophan normally can get converted into things like serotonin, but when there is a low grade chronic inflammation, it takes a different path. It starts to produce something called kynurenine acid, and the kynurenine acid actually causes neuro-inflammation. In fact, issue not just for depression, but also for Alzheimer. And that paper is going to be coming out very soon, I just looked at the paper.

Dave: Yeah, very cool.

Naveen: So, it's going to start showing you that even the people who are depressed when they become suicidal, it is the increase in the ratio of the kynurenine acid to the KMO, that actually causes them to change their behavior completely. So, this inflammation in this document is absolutely for real. And what we're going to do a day that I think we haven't quite shared with anyone yet is, the next text we're going to be launching, is going to be looking at the blood, at a full blood, with a finger prick blood, we'll be doing a complete RNA sequencing. That means, all the genes that are being expressed in your blood, and you get with the whole blood, not just the plasma, the whole blood, you get the mitochondrial gene expression, which is the ancient bacteria, which is different from your own DNA, and all of the blood cell gene expression. And since the nucleus is the white blood cells, you get all of the cytokine transcripts at no additional cost.

Dave: Whoa, and this is only like \$199 right now.

Naveen: \$199, you'll be able to see all the cytokine transcripts, all of the human gene-

Dave: I spent tens of thousands of dollars on that data. Oh my God.

Naveen: Human cell gene expression, mitochondrial gene expression.

Dave: When is this coming out?

Naveen: It's going to be coming out in next couple of months. We're already doing it for thousands of people.

Dave: I know I submitted my sample to be part of the original study, I could get to see the results on that. Okay, that has me... I didn't know this will be the same price. I mean, that's cool. Well, here's what the authors of the computation biology study found, they found that the reduction in dopamine was probably our body's response to tell us to slow down, so we could heal from whatever caused the inflammation. But, what it does instead, is it directly sucks willpower. And actually say it there.

Naveen: Yeah, of course. They said the [inaudible 00:54:20] system.

Dave: It's the thesis behind the [headstrum 00:54:23]. When you eat so that you lower inflammation, when you make mitochondria work better, which are bacteria, that by definition, lowers inflammation. So, when you do that, you have more energy, you have

more willpower. Well, it turns out your dopamine, your reward system that makes you get up and go and do exciting things, you probably have stupidly high dopamine levels, Naveen, because you're always excited about everything you do is cool. But, whatever your dopamine levels are, if you had inflammation chronically, they would drop, and then your zest for life goes down. And so, what's going on here is, you eat the wrong food, it causes bad bacteria to grow, it suppresses good bacteria, and creates inflammation.

Naveen: I'm going to correct you, Dave. It's not about good bacteria or bad bacteria, your gut ecosystem producing the bad stuff and the good stuff. Not them being good or bad, it's the ecosystem, [inaudible 00:55:10], the whole ecosystem that produces. Because, remember, they eat each other's stuff, right?

Dave: It's a fair point. It's like going into a jungle and saying, "What's the species that creates oxygen?" Interesting. Well, there's many of them, and if you don't have the ones that eat dead plant matter, that don't create oxygen, you won't have oxygen creation down the road. So, fair point, it is clearly a biological system. However, when a system gets out of whack, it's usually because there's too many bad guys, you don't have good guys. So, you whack the bad guys. And really, your gut is supposed to do that by itself, and it does if you eat the right stuff. So, all you're doing is, you're putting the right inputs to the system to nudge the system towards the outcome you want. Even if you don't even know all the variables that are in the steps in the middle, that's why black box biology. And black box is a computer science term.

Dave: The idea is, we don't know what's going on inside there, all we know is that we have the ability to put things on the top of the box, and things come out at the bottom. How the heck do you solve that problem? Well, that's what computer hackers do. And what you're doing there is, you're literally hacking the gut, because you're saying, "We're teasing apart some of these pathways. There's a lot we don't know. But we know-

Naveen: But we open up the box?

Dave: Yeah.

Naveen: But it's no longer... I mean, the black box, actually, now you're able to open up the box, see what's there, and use the AI to be able to actually manipulate them at a molecular level. It's literally not just input and output, and the black box, you're able to now look at the machinery inside, and to be able to say, "Okay, let's change this pathway. Let's change that pathway, so you get the right output." And analyzing those pathway was never possible before until now. And that, to me, is a real breakthrough.

Dave: Well, Naveen, I have fun with you every time you come on the show, I get even more excited about all kinds of things than I was before. And that happens when we get to go out to dinner after this. So, thanks for being a frequent guest on the show, always have something new to say. And just thanks for being a friend and advisor. And I'm happy that I can call you when I want to talk about gut bacteria or the best way to help a company to succeed, you've done both many times for me. Thanks for being here,

thanks for sharing your knowledge and just continuing to make company after company to do good things. I know you don't have to do that, you just do it because you want to, and that's cool.

Naveen: Well, Dave, first of all, I get to work with the smartest people like you in this field. And secondly, everyone who's listening to it, must find their own moonshots. And if you don't have your moonshot, and if you can't jump out of the bed in the morning, when you wake up, you're working on something wrong. Do things that you enjoy so much, that you cannot wait to start your day. And when you do that, you will find joy, and you will find energy. So, all I can tell you is, find the moonshot and find me on moonshots.

Dave: Speaking of finding your own moonshots, the two things that you want to know about on the show today, one, if you are new to Viome, V-I-O-M-E, is where to go for that, viome.com/Dave. But, the other thing that's really important, your podcast, Moonshots, is just being released. And you're a really inspirational guy, you have great guests on, and I am a guest on your show very soon here. So, if you're following Bulletproof Radio, you're subscribed, thank you, on iTunes. You want to go over right now search for Moonshots, Naveen Jain, you'll find it. And subscribe to that show, download the first couple episodes, download mine, we'll talk about cool stuff you didn't hear about here. You want be inspired? This is the man.