Introduction and Autoimmunity Basics

Hey everybody, Dr. Bob here. I'm here with a luminary in the areas of functional neurology, functional medicine, one of the smartest guys in this room without question.

Doc, how are you today? Pleasure to be here. Nice, thank you. This is exciting, man. I've been following you since I got out of school. You know, we got about the same time and you've just blazed a great path.

So much information. A researcher, scientist, practitioner, author, and a teacher. Your plate's busy, my friend. So let's delve right in. You know, one of the things you talk about a lot is autoimmunity.

And in auto immunity is, I think, let us lay the groundwork. Why is there autoimmune on the rise and what is it? So auto immune is just when the immune system starts to target some of proteins or tissues in your own body as being formed like a pathogen and starts creating an immune response against it.

The key feature of it from a laboratory diagnostic point would be what we call autoantibodies. So antibodies are typically made, as most people know, to fight a pathogen.

If you get a virus in, your body makes an antibody for the pathogens, so the immune system can find it and destroy it. Autoimmunity is where the system basically dysfunctions and starts to make antibodies to the body's own tissues.

It could be an enzyme in the and there's sort of various tissue in the body, but then the person starts to have their immune system destroy their own tissue.

And this really then creates a, you know, chronic degenerative cascade. Unfortunately, no one has really figured out the cure for autoimmunity. It's really just a disease where You can put it into remission and slow down the expression response of it.

At times, sometimes people may feel like they're cured. But they do have ups and downs. They do flare ups. And it's really a growing disease. No one really knows why autoimmune disease has been exploding.

The rates have gone up. It's also starting to affect a younger population than ever before. I mean, the scientific theories are basically that there's an environmental component.

There's different chemical exposures over a period of time, different genes that are susceptible, changes in how we change proteins in our food through hybridization, through GMOs.

So it's basically this soup of chemicals, pathogens, genes, environmental exposures that all start to merge together that then changes the expression of the immune system.

And once this switch turns on to attack the body's own tissues, it is really difficult to turn it off. fascinating. There's a lot to unbox with that. So it's the body's producing antibodies.

It's inability of the immune system, if you will, to differentiate between self and foreign, producing an auto antibody. Now, do those antibodies attack each other?

There's some complex proteins like agglutination where some antibodies can react with each other, but for the most part, what's more fascinating I think with that is that what they're finding is antibodies made to one tissue can actually bind into another.

So for example, the one common autoimmune disease in the world is Hashimoto's, which is the main cause of being able to become hypothyroid. 98% of the people that are hypathyroid actually have an auto immune disease, whether they know it or not.

But what they recently found in the past 10 years is like these thyroid antibodies, TPO antibodies can also directly attach to proteins in brain, specifically the cerebellum.

So then these people are actually getting degenerative changes happening much faster in their brain and they get this known for neuroinflammatory response in your brain.

And they may not be aware of that. This is really why many people have like Hashimoto's or they might know it as just being hypothyroid. Even though they're on thyroid replacement, they are not really getting anything done to manage your autoimmunity and to continue to progress.

And this is why doctors usually have them come in every year to get their thyroid levels checked because they expect their thyroid tissue to be destroyed more in the next year or so, so they may need to increase their dosage.

But for example, this connection between these antibodies binding to other tissues like the brain is just totally ignored. And then they may have these degenerative changes taking place in the brain and specifically the cerebellum that will impact people's cognition, their balance, and their ability to handle motion and movement.

So this is, I think, what's really fascinating about antibodies and autoimmunity is that we're learning that they're not just attaching that one tissue that you first thought.

They're actually attaching to multiple different tissues in a body. And this a very interesting area of exploration as a clinician and as patient dealing with an autoimmune disease.

So these antibodies that are getting attacked, obviously there must be a stimuli. So I'll throw one of the stimuli out there. Probably one the biggest egregious ones would be gluten.

Am I correct? Yeah. You know, the thing with autoimmune disease, this thing is very frustrating for practitioners and the patient. It's, you know in the classification of a multivariate disease that isn't one variable.

So there's some strong associations, for example, the celiac disease and many autoimmune diseases and gluten reactivity with many different auto immune diseases, but it's not like one thing.

Now there are some stronger variables that have a greater power and effect on a tissue.

Triggers, Gluten, and Multivariate Disease

So for, example if someone has severe reactions to gluten and they have celia disease, which is an auto-immune reaction in gluten, they genetic overactivity of how their immune system and their T cells respond that are much more aggressive even than how they react to a pathogen.

Some of those celiac diseases, for example, turn on like we talked about, like Hashimoto's hypothyroidism very aggressively in which even when they've done some studies where they have people come off gluten, it can pretty much in some cases reverse the condition, put them into remission immediately, but in others it doesn't do that.

So the frustrating thing is if you have autoimmune disease, like you go on the internet, you just read those simple things like, if he just fixed your microbiome, that's going to go away.

If you fix leaky gut, its going away, for just gluten free, It's gonna go way. And those things may have some impact, But I think the key thing to understand about some of these chronic diseases, especially autoimmunity, that it's a multivariate disease.

And these variables that can trigger and push the disease can change over time. They can as your genes change. So for example, as you age, certain genes turn on, some genes turned off.

The disease is always dynamic. It's always changing, and there's just this constant battle of trying to figure out the right diet, nutrition, lifestyle, nutraceutical intervention to try to optimize function.

But it is not linear, it isn't simple. People use the word root cause. It's not a root-cause-based disease. There's multivariables, and people are searching for this one root cause that may cause it, but it's more complicated than that.

Now, gluten certainly plays a huge role in many autoimmune diseases because it is what they call modern wheat in the immunology world. or wheat has been changed in the structure of the proteins and the protein sequences through things like hybridization of seeds, through what they call haptination, where chemicals like glyphosate bind to gluten and change the proton structures to become much more immune reactive.

With certain gene pools, it becomes devastating. So these things are all happening. It's a bit complicated, you know, and I think the average person that's suffering is just trying to look for a simple answer, simple thing, it's not always so simple.

And I only say that because there's definitely hope that you can do things to dramatically change it, but it is a dynamic game. It is not a single rule, not like one root cause for all these things when you're dealing with a multivariate disease like autoimmunity.

You just really explained something truly complex and the basic premise is root cause resolution is a great concept, the starting concept. But it's really root causes resolution.

And I've got something that you said that autoimmunity, there's no magic pills. just lifestyle changes, and you indicated sleep, stress, exercise as a few.

Could you give some of the remedies to autoimmunity? I know you won't be able to give everything because you take everybody as an individual, n equals one.

Right. So the thing is, the key feature of autoimmune when you look at it and dissect it down to what's happening with the immune system, there's some key features.

In the world of immunology, they refer to it as loss of tolerance. So it's a field of immunology where the immune system has a hard time distinguishing their own tissue from foreign tissue, and that's the whole hallmark about immunity.

And when people lose this tolerance, what they found is that there's many different immune players that are involved. So there's a very important cell called regulatory T cells, they regulate how aggressive the immune system responds against something.

They are dysfunctional, there are cells called dendritic cells. These tend to be overactive with autoimmunity. There's even cells in the liver like creeper cells that have like the mutiles of the lower they become they've become overreactive overzealous.

there is changes in how different antibodies start to react against the self tissue proteins. There's messages in the thymus gland that can dysfunction.

There are some general rules that seem to have some effect on loss of immune tolerance in all aspects of immunity, for example, sleep. I mean, it doesn't really matter if you have a chronic infection or an immune disease, if sleep is necessary to really help prime the immune system, help it function well.

Lots of different physiological steps take place to balance out these systems, so sleep is a big issue. There's a

phenomenal explosion of research on exercise where they're finding muscle tissue itself releases proteins called myokines, and there's also things called extrakines.

that are released when we move that then modulate the immune system in different T cells and B cells in some of these immune players and these chronic diseases that seem to have a very powerful effect.

And there's just a whole entire explosion of research the past 10 years on the psychoneuroimmune response where how we deal with stress really impacts how these systems express.

So the very basic fundamental things for someone who's got a chronic disease that involves the system like autoimmunity is the three key ones are like sleep, exercise, healthy relationships, those things make a profound impact.

And it's almost like if you're dealing with an immune mediated disease or a chronic disease, you can't go wrong starting with those. Those are great lifestyle hacks.

But you brought up the idea of immune tolerance. Some of the things in our field now people are talking about immune competence. So could you differentiate between immune competence and immune tolerance?

So immune confidence is like in the field where you're trying to see, can your immune system actually fight and destroy a pathogen? Can it actually do its job?

And immune teachers, this ability to distinguish between self-tissue and non-self- tissue, like pathogens, for example. And tolerance is his own field, and what we're finding is tolerance has been disrupted much earlier than ever before.

We're fighting like many mothers who have children, their offspring tend to have autoimmune disease much There's a bunch of research that's really shown things like autism may really be autoimmune disease while the baby's developing.

And there's these studies that are clearly showing that kids that end up developing autistic traits later have brain autoantibodies developed from the minute they're born.

They can see these immune responses taking place. So tolerance is really about distinction of self versus non-stealth. And competence is about how effective the immune system is destroying tissue or a pathogen, I should say.

So give me your three best things for people listening to try and quell some autoimmune. I know I don't want to wrap you in a box. Somebody give you the attitude.

There's some generalizations you can make, right? And like, and just for general health, like people definitely need to figure out their sleep. Sleep is a big one right now.

It would be a huge variable for them. They will know, for example, if they don't get good sleep, they're going to have a flare-up.

Lifestyle Foundations for Immune Tolerance

Let's say someone has rheumatoid arthritis. Rheumatitis is one of the most common autoimmune diseases as well, and that's where people have like a swelling of their joints and start to get arthritic changes as their joint starts to deform.

Then they notice the arthritis really flares up if the haven't had a couple nights of sleep that are good. The notice when they start sleeping better, their inflammation and joints will up a lot better.

So, you know, sleep is a big one. So sleep will involve like, can you fall asleep? Can you stay asleep, how's your sleep quality throughout the night?

Are you waking up several times throughout night, like you could have someone with autoimmune and have sleep issues, but the sleep issue is maybe they have an overactive bladder.

So they keep waking up every few hours. They never get this long extended sleep, which is really what the immune system needs. So as a clinician, maybe we're working with, how do we try to support the overactive bladder?

Maybe we have to have them stop drinking any kind of fluids by six o'clock, and then they can start sleeping through the night. It all depends. For other people, they have, the can't sleep well and they tend to get hypoglycemic.

The wake up the middle of the morning at three or four o clock, set the heart rate up, that crave sugar, date something, go back to sleep. So even though sleep is an issue in a clinical setting, you still have to figure out what's the variable in sleep.

Are they not getting extended periods of sleep? Do they stay asleep? Some of them just can't fall asleep. That's another issue. So, even if we say, oh, we've got to sleep better, a lot of times in the real clinical settings, We didn't have to figure out what are the variables that are causing their sleep to not be efficient as well, right?

And sometimes it's just like poor sleep hygiene. They're just staring at their phone all night or, you know, they're, You know they just distracted. And they are not going through a ritual to help their body relax, to calm down so they can sleep.

It's like we have figure that out. Like for some people they have like exercise. really hard that morning to sleep that well that night other people have to like if they actually too late in the day then they can't sleep and too wired like there's just definitely trial and error and this is what's yeah and This is like what so frustrating when you like I can watch social media stuff with healthcare practitioners anymore I always watch and I just go you've never clinically practiced like gets so frustrating because people just try to put the general rules on things and it doesn't really apply that way.

Everyone that has a chronic disease has to go through a period of trial and error with key concepts and then figure out how they apply to them and what's working for them.

So for example, someone has debilitating autoimmune disease and someone goes, oh, if you want to sleep well, you just need to have your room temperature be 75 degrees and you have to this perfect mattress and they may do that and has no effect with them, maybe it's the person that has to eat, you know, six high protein meals throughout the day so that blood pressure doesn't drop at night, then maybe that's their answer for being able to sleep through the night.

So we can get some general principles like sleep, but ultimately it's like how good is the quality of your sleep and then what are some of the variables that are affecting it, and that is where you play this clinical game.

And for the person who's dealing with the chronic illness, it is really frustrating because all you see out in the world is these generalizations without really individuality.

And it's even more frustrating when you go see a practitioner and the practitioner doesn't dig deeper and they don't know how to clinically dig deep. Then they're frustrated, hoping they would have the answers and then they know and end.

This is why we have this growing population of chronic disease that just feel abandoned and have nowhere to go. You make a great point. We're going to be, this is the first podcast you said you've done in three or four years.

I'm going to be using Reels, we're going be on Instagram and all that. We're gonna be sharing information. And

there are some influencers like you, I found they're abhorrent.

That said, let's talk about what we do, the concept of functional medicine. Let's about some of the things that are wrong that need to corrected to right that ship.

Well, I mean, functional medicine, the problem… I'm a functionalized practitioner. I identify myself as a Functional Medicine Educator, and that's what I do.

It's part of my career. And the principles of functional medicines are wonderful because the goal is to try to improve function. Function could be making sure hormones are optimized, making your blood sugar stabilized, make sure your immune system is confidence, you're just trying to prove function, And when you look at, for example, conventional medicine, pharmacology is completely opposite.

Everything is there to block and inhibit. So we have protein pump inhibitors and beta blockers. It's all block, inhibit, downregulate, serotonin-reptic inhibitor.

If you're looking at the top common drugs, they're all blocking, inhibiting, and down-regulating. And that's not really increasing function. That's shutting down a part of some kind of clinical outcome or a biomarker outcome.

The goal of functional medicine is, are your physiological functions all operating at their peak? Can you have normal bowel movements throughout the day?

Is your edge level stable throughout your day, is your cognitive function stable, can you synapses? All these things are the goal functional medicines.

The principle of functional medicine is fantastic. I mean, it really is such a great way to think of how the body works. It's not really disease-focused.

You're not necessarily coming in and saying, well, for example, we talked about autoimmunity. So there's auto-immunity, you don't just go to like an autoimmune protocol, auto immune drug.

You go, what part of their auto, you know, if they have auto-remedy, What are the variables? And we talked about sleep, for example. So then you have sleep and then they go to the, variables that may impact their sleep from a functional medicine point of view.

Like we, we talk to examples like overactive bladder, blood tributus regulation, maybe they've got high cortisol or something like that. It's impacting their levels.

But the goal of functional Medicine by itself is a phenomenal concept. Except one of the problems we have with it is like people that practice functional, medicine may not really understand it that well.

Or they don't agree. Functional medicine is all about depth. How deep can you go? And how well can see these interconnections with the person? Then what do you do to improve physiological function?

That's hard. So to give everyone a break, that's fraction functional medicine. It's not an easy task. And since it's not an easy task, people sometimes try to simplify the steps involved, and that's where you get sometimes very simple equations.

I think what's failed with functional medicine education is when people say stuff, like educators say, stuff like, well, if you don't know where to start, just start with the gut.

That just basically means you have no idea what you're doing. And by the way, everything a person does is gonna impact the gut. If you sleep, that's gonna affect the microbiome.

But if you take hormones, it's going to affect microbiomes. So what they really mean is let's start with the guy with

supplements. One of the things that I think translating to functional medicine that has become a little more inefficient for both the patient going through treatment and practitioner providing it.

is it just becomes, which supplements do we start with? It's really become the supplement game, and it's become how many labs do you order? And this, partly, I think, influenced by the main educators of functional medicine have always been nutraceutical companies and laboratory companies.

So they have that heavy, heavy influence on auto-functional medicine. Because when you go to a conference, when they go a seminar, they're usually held by some of these companies, or if you get to the vendors at a conferences, you're all there and they all have their influence of the speakers.

that really starts to kind of… strongly influence it. So you can almost tell when someone's gone to a functional medicine practitioner that doesn't know what they're doing because they'll have hundreds and hundreds of tests and then hundreds, hundreds supplements and very little focus on the actual lifestyle or interactions and how these things work and prioritizing.

And for myself as a function medicine educator, one of the things that we talk about, it's not easy to find every things are wrong. If you take an average person and run different panels.

Let's say you run a GI panel. You're going to find some type of microbiome imbalance or some sort of digital marker that's a little bit off. If you're running a red blood cell nutrient analysis, you can find nutrients that may be low in some person or another.

Or if you do run some kind of toxicology profile, environmental chemicals are off, So when you run a bunch of these tests, you're going to find people will have little balances or even sometimes big imbalances here and there.

So finding it is not the hard part.

Functional Medicine vs Protocol-Driven Care

Prioritizing where to start and how they all interact with each other is really the skill of functional medicine. So I think what happens to a lot of people who learn functional medicine or work with a practitioner in functional medicines, they just kind of do this deep, deep search for everything, find everything and then try to supplement everything.

And this is where patients get frustrated because now they're spending thousands and thousands of dollars on tests that doesn't really help start in the right place.

Then taking all these different supplements because they are treating every lab marker that's abnormal with the supplement, just like people treat every disease with every drug and end up with multiple drugs.

And this is, I think, where things can go wrong quickly in a functional medicine approach. I hardly agree with you. A wrote a question down. In your opinion, you own an institute.

It's all about learning, it's about helping the patient via information. What's missing in most practitioner education, especially with the rise of this protocol-driven care?

Everybody says, hey Rob, what's the protocol for autoimmunity? Hey Rob what is the protocols for rotator cuff? Et cetera. Yeah, so I think that's one of the problems we have.

So in a functional medicine approach, we're not really protocol by disease-based conditions, right? Like we may have protocols, for example, what are some protocols if we see white blood cells low?

Look, there's some things we know with lifestyle and neurophysiologicals that may impact on raising white-blood cells, but it's not for a certain condition, Right?

What are the protocols and lifestyle factors that can improve insulin signaling, But it is not necessarily for certain conditions. But you're just trying to, let's say, improve the insulin sensitization.

So, like, in a functional medicine model, it's not really the disease or condition that's based, that approach. It's really what's the mechanism of the physiology you're trying to change with them, right?

Are you trying activate GABA receptors? What are you, you know, what are trying do? So that is where we have some interventions. We have to have, some degree of things we know we do for certain mechanisms, but it is not disease- or-condition-based.

So I think that's kind of the shift in learning. So, I have my own Institute, the Crossey Institute. We have over 5,000 doctors, healthcare practitioners that have been studying there since 2016. And recently I made a new educational program called the Academy of Functional and Lifestyle Medicine.

This was because we noticed that a lot of functional medicine doctors and especially physicians just didn't have any real training in nutrition protocols.

And like a dead giveaway practice doesn't really understand like the foundation to basic nutrition, which is one of the key essential parts of functional medicine is they just basically use the supplement that a nutrition company recommends that they like, and that's kind of how they think of things.

They think I have this GI product from this company for this, but they don't know which of these ingredients are how to use them. Then I distinguish one supplement to another.

So for me as an educator, it became very clear like okay, hard-growing group of practitioners, especially physicians and nurse practitioners that never really got any good training in nutrition.

Also, many chiropractors, acupuncturists, they never get really foundation-based nutrition, and they were having a hard time getting to the next level because they'd never had that back.

But even for myself, when I was on my journey, I needed to learn more. I had to get a master's degree in Nutrition, do a lot of self-study, take a bunch of conferences and courses to Apply it into a clinical setting.

I mean, it's just it skill you have to have. So I think a lot of practitioners that learn functional medicine, they never really had that strong foundational background in nutrition.

They may not know the difference between evening permazole and borage oil and EPA and DHA and what kind of compounds are in them, how they have a different effect clinically.

They just think, oh, I like fish oils. I'll just use this. And you can't use flaxseed oil. That's aceto. Well, that's going to cause harm. We kind misinterpret what they mean by cooking oils and rancid oils versus supplemental.

that whole foundation is just gone. And they think, oh, well, if I just do multi, it'll cover everything. So that's good. That's not really how it works.

As an educator, I've seen this mnemonic, like starting with the gut or just doing what's called, for example, a four-hour program or a five- hour program where they say replace, reenact, restore, these basic rules.

Just simplify things. things too much where they don't have the strong foundational stuff. So for myself as an educator, when they develop the Crossy Institute and create a functional lesson program, it's a 300 hour program.

We have 200 hours of coursework, all with evidence-based research and mechanisms and physiology that aren't really focused on protocols for conditions, but protocols and physiological mechanisms.

Then I have 100 hours of clinical ground rounds where you see me actually work with patients in my practice, really

monitoring some of the patients we've followed for two years, like the first intake to how they follow up with labs and things over time, so they get real clinical education.

And then recently I'm like, okay, we're having a hard time in our group and this is where we started the Academy of Functional Nutrition Lifestyle Medicine because they're like we got to give them the foundations, fundamentals of clinical nutrition, not academic nutrition.

So it's like this evolving step. And for me, I realized ground rounds, clinical ground round is a big issue because people learn about functional medicine.

But when you actually work with a patient, it is never anything like you learn in a seminar. There's multiple variables you're trying to pull on at the same time and see how they interconnect.

I mean, the other thing, to be fair, it's a long journey for people that want to learn functional medicine. Not to say you can't get clinical results not being very good at it.

You can get traumatic clinical result with people dealing with health chronic conditions today just by simple concepts of functional medicines. But as you are dealing chronic disease like autoimmunity, you really have to have this level of depth.

to be able to figure things out and go through the trial and error journey with your patients to see what they respond to and figure out what interventions are really working best for them.

There really is a need for this individualized personal development with each individual person. N equals one, I agree. I've heard you circle the wagon a little bit with gut.

So let me ask you something about the gut-to-brain immune axis. You're an expert on it. We now understand about that gut to brain connection. What is it that we now understanding about it, that you didn't know five years ago?

There's a lot. I mean, I wouldn't call myself an expert, but I consider myself just being exposed to it as some of the research is coming out as well.

But we know like the gut itself, the microbiome release is what are called post-biotics. You know, everyone knows the word prebiotic, where things like fiber help support beneficial bacteria.

Then stick to the microbe for a second. The microbiome is also more complicated than we ever thought because what we used to call bad strains or good strains, it's not that simple.

What we're finding is even when we talk to top researchers studying the microbiomes, they're like, we can't label these things. It's so complex. We're going to have to use machine learning to even have a clue.

what different bacterial profiles that work and integrate together are actually having an effect, they're having effects in different ways. But ultimately, it's about these bacteria in the gut, and these bacterial gut release what I call post-biotics, which are like signaling molecules, things like lipopolysaccharides, some of these factor produced different peptides and neurotransmitter substances.

And these are communicating agents. So the bacteria we have actually create these messenger systems throughout our body. These messenger system can impact our brains, since we're talking about the brain access.

But these messenger systems can get into our blood, into circulation, then across the blood-brain barrier have an effect. But we also have direct pathways that go from the gut itself to the brain.

Like the vagus nerve is, innervates in the entire gut, but goes right up to brain stem. So some of these message pathways go straight up through the what are called canalized pathways.

And then non-canonized pathways are basically what's in the neurochemical environment that we have in our system, in your body. But the microbiome is definitely having an impact all throughout the body, as we've always known in, you know, the fields of natural medicine.

And now it's great to see all these researchers doing it. So there's an explosion of like the micro-biome diabetes connection, and the myocardial myeloid cell, micro biome pulmonary connection.

Every gut, everything, access, now there's like a gut something access. Got pulmonary access got renal access cut liver access get everything access because they're realizing that these bacteria in the gut are really having all these influences.

But it's not as simple as like just taking a good probiotic, which then get this is where like everything goes wrong or you just translate it to the oh you're just getting For example, some of the most profound research on what changes the microbiome more than any supplement is physical activity.

If you look at the research and what happens when people contract muscles regularly, the profound effect of these muscle proteins called myokines, these bacterial species is much, much more profound than ever taking a supplement.

functional medicine educator will see stuff like, yeah, I got my patient. I put them on all these supplements. They hadn't changed their diet. Eating all of these foods, not fermented foods.

Restricted all gluten, dairy, soy, all this bad stuff out of their diets. Not eating sugar. And I still can't change their GI panel. Tell me more about the patient, like well, they're so tired.

Their sedentary. Why don't you start there? Why have to start pushing that a little bit because that's going to have a very profound impact on the microbiome.

And then there's also studies that show if someone's in a hypothyroid state, their microbiomes is completely dysfunctional. So sometimes like fixing in the functional medicine, a lot of times you find out it's like, fixing the gut really involves going in other areas.

And the mistake is just to focus on like supplementation for it itself. I think that's one of the frustrating things. So going back to your original answer, like the Gut-Brain Access.

There's all these relationships between the microbiome and gut. Diet and lifestyle factor has an influence on it, but these other variables may have a profound impact.

And for clinicians that are actually measuring the gut through different biomarkers, like a microbioma profile or different digestive markers of the panel or inflammatory markers in the cut, the most common thing to see with people that going through that journey with their patients is that learning functional medicine is It's not a simple supplementation.

It really has to be this whole patient approach. And you could have a person who's sedentary and the microbiome is terrible, and then you have the mood and still nothing changes.

Gut-Brain Axis and Microbiome Signaling

As a clinician, you go, well, that wasn't the variable that we needed. Then you might find out. They really have to get sleep. That's when they start sleeping, the microbe changes, And the frustrating thing is we don't know what's going to change the variable.

So as a journey of someone who's dealing with chronic disease, or if you're a practitioner of chronic diseases, you have to realize it's all about this continued dive into trial and error with this thing.

The great thing about labs is you use them as the baseline that they compare them to, to have some objective information that's happening with them. If you can do that, then you could play this chronic-disease game and this N of 1 game, this individuality personalized approach game.

Let's talk about neurodegenerative disease, autoimmunity, and the gut-to-brain axis. Is it the guts of the brain? Is that the brains of a gut? We do know that it's bi-directional.

It's bidirectional, so let's start with the brainy gut axis, there's a very profound relationship between brain function and gut access. The brain basically has a very powerful effect on the gut through the vagus nerve, and the regions of the brain, but they kind of descend down and they fire into an area of brain called the plantar medullary area.

These plantal medular areas are respiratory autonomic centers, and then from there we get activation into the gut. So when they look at injuries with traumatic brain injuries, they see within hours in animal studies complete death.

Inflammation in the gut, hyperactivation of immune cells, severe inflammation, they see leaky gut happen within six to eight hours. So we know like when there's the most acute severe disruption of this access through traumatic brain injury that we see the dysfunctions in that gut.

There's some researchers that looked at traumatic injury studies in animals where they vagal stimulation, and then all these impacts in the gut were mitigated.

They really didn't develop the severe leaky gut, their immune system in their gut didn t really flare up and acute. So it really showed how powerful this relationship is between brain function and the cut.

And the key thing with the brain too, the sprain gut axis is as the rain degenerates, these areas in nerve called the enteric nervous system that are in gut they start to degenerate too.

The keeping a healthy brain really means keeping healthy neurons and when you keep healthy you're keeping that brain-gut access viable. So as people start to develop neurodegenerative changes in the brain, what they're also finding is the gut is aging, is degenerating as well.

What I mean by the good, I meant the nervous system pathways in a gut from the vagus. You have these disruptions as Well. When you look at things like neuro-degeneral diseases like Alzheimer's and Parkinson's, you see really poor gut function.

It's just a consequence of this brain gut access. We see kids have developmental delays. You see kids suffering from things like autism, they have really bad cuts.

And then a large part of that is this component of just brain health is not there to constantly activate these vagal projections down into the cut. You're preaching to the choir.

I love it. Vagus nerve, cranial nerve number 10, medulla vingata down through the transverse colon. The gut-to-brain axis, whatever you do to gut, you duty your brain.

Whatever you're duty brain, duty gut in a millisecond. You may have heard that one before because I think I may've copped it from you. Interestingly enough, so let's turn the page a little bit.

I want to know your thoughts on GLP-1, gut peptides in microbiome-directed therapies and their effect, not on weight loss, but on cognitive health. I think for me, it's just an area I'm still learning about and looking at cautiously.

I just think more and more connections are going to come out over time. When you're dealing with a peptide, you deal with the signaling agent, and when you start dealing the signalling agent over the time, we're going change receptor site responses and sensitivity to it.

There's definitely a role for peptides therapy in all forms for different types of things, for sure. I've seen people that

have severe things like polycyclovarian syndrome, where they get really stuck in this insulin cortisol web, or they can't get out of it no matter how they diet and do things do really well with things, like a peptide type of therapy.

Then you see like the abuse of. I think we're going to see this. you know, post-GLP-1 syndrome coming out over a period of time. I think it's literally that, just like all things, when people overdo it, they have some side effects.

So I, think more information is going to come out with it. But you, know these peptides like GLP 1, that have effects all throughout the body. They're not just affecting the appetite centers.

I'm not well versed in the cognitive effects or neurological effects of them, but there's no doubt they would have some effect on them. You probably know I brought that to an idea.

So without question, whatever we do that positively affects the brain. But it's interesting with these GLP-1 receptor and the dorsal-medial hypothalamus communicates with the GLp- 1 in a gut.

What's interested is that is a direct communication of the blood-brain barrier is not protecting it. Speaking to you now, That's exciting for me because that really exemplifies the idea of the gut-to-brain axis, how critical it is to communicate in a proper manner.

Right. Yeah. I mean, that's the key thing. But some things that are really, really GLP-1 natural, there's things like fiber can have a huge impact on those things.

Berberine. And people are trying to control their appetite. Sometimes just having a fibrous drink in the morning can make a big impact. A lot of times we'll have some of our patients just take a fiber capsule with each meal that slows down the glycemic index response and helps increase and control their appetite centers.

There's a place for it. I don't know what's going to happen because weight loss is such an emotional issue for so many people. It's beyond thinking through what the long-term effects are.

So I think you're going to see a lot of overuse and a lots of abuse with it. But I we're gonna see over time, but there's definitely a place and benefit for many people with.

The NIH has said 80% of bacterial infections in the gut have had a biofilm, which I call an acorn to keep it simplistic for my patients. An example is it's kind of sticky, gummy, kind like plaque.

Now I come to you and I have biofilm. One, what would the test be for the biofilm? And where would you start as a practitioner? Because I know you see patients.

Yeah, I mean, you know, biofolms itself, uh, not aware of any really good laboratory tests to determine bio-filming. If it is like an upper sinus infection, It's pretty obvious you have the coding in certain areas.

You can physically see biofilm when they look at certain endoscopic things. And if they do sampling of tissue, they can see biofilm cells all over the place.

But, you know, ultimately the key thing is there's just a class, there is a bunch of natural biofilm disruptors. There's even mechanical disruption of some of these biofilms people use.

But it is the biggest issue I think we have, and I thinks it's one of the things that's going to drive chronic infections. Right now we just have a limited view of natural compounds that have some strong anti-bioform capabilities, but it will be a big factor in different types of pathogen resistance.

I hope we develop some breakthroughs with it over time. But it's really an issue and I've definitely been stuck with some really chronic sick patients not being able to disrupt the biofilm and just frustrated as well.

It is the bane of my existence aswell. Food sensitivities, I believe they're one of the leading causes for chronic

hidden inflammation. Also, you can make the case that they're a reason for autoimmunity.

What are you looking for in a food sensitivity test that makes you most comfortable? Well, I think with food-sensitivity, we have to understand a couple of things about them from an immunological perspective.

Food sensitivities can have different effects on different people based on multivariables. So there's a very important concept in immunology called molecular mimicry across reactivity.

This is where, for some people, a food protein they make, those antibodies against that food, food proteins may then attach to their own tissue. So a really great example of that is gluten.

And especially in the celiac disease genetic populations, they have such an overreactive response to making gluten antibodies and get exposed to gluten, but For some population of people, we don't know what the variables are that make them susceptible.

When people make, for example, have an immune reaction to gluten, the gluten molecule can then attach to the myelin sheath of nerves. So now this gluten compound is attaching to myelin sheathe, and it's telling the immune system this is foreign, so this causes severe destruction, right?

So you could have one person for a set of genes and different variables that have turned on this sensitivity, they have a bowl of pasta, and their brain gets severely inflamed from it.

Another person may have some gluten antibodies made, but it doesn't have this cross-reactivity reaction with these myelin sheath cells, so it's not as devastating for them.

So certain food proteins can have molecular mimicry for different target proteins in the body. And for example, some people are very sensitive to milk.

Milk proteins like casein antibodies or milk betrafilin anti-bodies, they can attach to certain tissues in body for some populations. We did a large study where we looked at all the different thyroid target sites like TSH, T4, reverse T3, 5-di, and so the whole thyroid axis and we checked 208 foods against them for molecular mimicry.

And we found the study. We published the journal, Thyroid Research. And, you know, we tried to signal, like, if someone has hypothyroidism or is not making T3 well, these are some of the foods that may be more relevant because they have this potential for cross-reactivity.

What you do in a lab is you take a monoclonal antibody in the lab and they get the target protein and then measure the degree of reactivity using what's called optical density measurements.

Then you can map this cross reactively and make a list.

GLP-1, Biofilms, and Food Sensitivities

We did a study like that, too, for diabetes. I remember what the title of the paper was, but we looked at 200 foods that cross-react with islet cell proteins, and we found that many of foods cross react with the islets cell protein were low glycemic foods.

So we're saying in type 1 diabetes, I mean, diabetes is low-glyceamic and that's really the key thing. It has to do more with this reactivity to foods.

And we found like 18 really common low-wasting foods that actually have molecular mimicry with different target proteins and violet cells that are associated with type 1 diabetes.

So food sensitivities, for some people, can just cause low grade inflammation. For some other people that have this molecular mimicking mechanism, it can cause devastation.

So not all foods reactivity responses are the same from one person to another. I think for most people, especially as they get older, because we lose some degree of tolerance as we age, we start to react to some foods we didn't do earlier on, and we're going to see antibodies show up in a profile.

But if the antibody shows up a in profile that then has molecular memory with the target protein, it can be devastating. And it could be life changing, changing those foods.

And for other people, you know, they have a food sensitivity profile and they eat the food. They don't really notice much of a difference. Maybe as time goes on, the heavy reaction and maybe there's different variables add into that.

they start to react against the. But, uh, You know. I think for most people that have never had a sensitivity test, we're kind of probably, it can show up with some antibodies.

Now we can see like a few, a, few examples of things where things are wrong. We're like, if you saw it as a physical sensitivity panel, and if they ran into almost every single food, That is what we call loss of oral tolerance.

So oral intolerance is not the same thing as autoimmune tolerance, oral tolerances reactivation to food proteins. And in the world of immunology, they use the word oral-tolerance to mean dietary foods.

When people lose their oral When we see if it's a view panel and they have, let's say, we tested, I don't know, 250 foods or something, right? We show up, they reacted to 70% of them.

We can't cut their diet out of the 70 percent of foods. They have nothing left to eat, and then if you just haven't eat the foods that they're not reacted and repeat the test, then let us just start reacting against those foods, so that's where you can just remove the food.

they actually had this immune tolerance issue. And then what we do in those cases is we basically leave, like if there's any foods that they don't directly cause reactions, we tell them to avoid those foods, but we keep their initial test as a baseline, and then we just try to improve their tolerance.

Then you might ask, well, how do you improve the tolerance? We might try to have a lot of different diverse fibers, we may work on things like sleep, exercise movement, and we might give them supplementation for their gut.

We may have stabilizer blood sugar levels, or we try and medicate their hormones under balance. You might just treat the patient as a whole and see if you can just improve all the things that impact the immune system.

And then if we see like they react to 7% of the foods and then we check them four months later and now they're only reacting to 50% their foods, Then we know we're going the right direction, right?

And then maybe down the road, they're only reacting to 35% of foods instead of 70. Then, we hit a home run. Probably never even get them to be non-reactive to everything.

That's not realistic. But it's a regression into the wrong direction. And I think for a lot of people, they want to see everything be perfect, but that's not real.

And you don't have to have everything to be perfectly on a food sensitivity panel to add dramatic results. There's some people that have… The caustic thing is if you see all the food sensitivities, it has to intestinal permeability.

It does not have be to just permeate. Could be anything that impacts the intolerance. Sometimes it's very simple. Sometime someone's just vitamin D deficient.

You just get the vitamin levels back up. And magic happens and other times it's just this complex web. This is why, you know, over my years of practice, I don't know over I think 25, something 26, maybe 27 years and almost now.

I just don t have any confidence of telling the patient this is how you're going to react. We don' t know. Let's see what happens. let's work through it.

You're so unique to yourself. Follow with your body's signaling. Let's just keep very good track of it. See what things are responding and not responding.

It has been said that food is a potentiator for health information when your body processes it in a positive, salubrious manner, whereas health can also be a potentially for inflammation.

Which foods traditionally, obviously you indicated gluten. I'm assuming milk is on that list, dairy. And if so, why? Everybody always says to me why. I mean, I have my pithy answers, but I want your answer.

I mean, okay, for gluten, I think it's very clear when it looks at the protein sequences of wheat. In the immunology literature, when people who study just gluten as a research field, they actually see what they call modern wheat, where the amino acid sequence of weed has changed.

So the structure of wheat has changed. I mean, it's a sequence of change with modernization, with haptination of chemicals, hybridization of seeds. It's different.

So they use the term modern wheat. And I think there's just some changes to that. You can say the same with many of the different reactive foods. The most common ones like we've seen in practice are for sure gluten and milk, milk protein.

There's lots of different great arguments of people that are experts in the field. They talk about milk and how we shouldn't be in animal products and things like that.

I don't have that degree of depth to go into it, but as a clinician, I can tell you milk, wheat, corn, soy, the big theory corn and soys at the GMO, that they've been really modified, their protein structure has changed.

Those are the main ones that we see, and then we have also see albumin egg protein be very reactive with many people. So, you know, it's interesting. One of my mentors who really helped me in my career and I did my PhD work in his lab.

I go, I become really good friends with him over the years and they go Ari, what would you do tomorrow if you had an autoimmune disease? Like if you have a crippling autoimmune disease, what are you going to do?

Because I want to be like this guy who knows everything about auto immune disease and food reactivity and- Yeah, godfather. Godfather, right? The god father of food sensitivity testing, auto immunity testing functional medicine approaches to it.

Like this guys, the scientist. He goes, I would go to Iran, he was from Iran. I live in a small village and just eat my native food. And I go, oh, okay.

That makes sense. And I was like, okay, so you'd go back to Iran, live in a farm and have your own food there. He goes, yeah. Maybe I just couldn't risk being here in America anymore.

I couldn' risk be in Europe. And have to go to a small farm where we grow our own foods. It's not exposed to all these different pesticides and chemicals and things that can change the structure of food proteins.

So I think there's a lot of truth into how we modernize food. with different types of chemicals and pesticides and farming techniques and storage. We have so much BPA and plastics and that we store food and we get so many things like different overgrowths of different kinds of chemical like yeast compounds, wheat compounds micro toxins in foods that are that were all getting exposed to when we ingest foods today.

So I think that's part of the reason we're getting sick too. And then when you change, when add food dyes and

chemicals to food proteins, the structure changes, it's not digestible, so it won't be broken down, since it is more immune reactive.

So I think all those things have all contributed to it. But the big players are definitely wheat, milk, corn, egg, and soy. So we've talked a lot about the gut microbiome.

The new microbiomes that everybody's talking about, maybe not new for you and I, is the gum microbiom. So, we're talking by gingivalis, the bacteria that causes ginger pans, its destructive enzyme, which leads down a path of a high percentage of people getting Alzheimer's.

Last night, they talked about gingivitis, increasing dramatically the incidence of Afib. How do you talk about the gum-to-gut axis? It's really, really important.

As a matter of fact, I mean, one of the screens we teach people to do when they do a new patient evaluation is to look at their gums, to make sure they don't have any indication of gingivitis.

And, you know, there's all these different bacteria, Pseudomonas gingivalis being one the most severe destructive ones that's been linked to many things.

We published a study in the Journal of Alzheimer's Disease linking it to different target proteins that involved with the beta amyloid plaques that develop in Alzheimer's disease a few years ago.

And there's other pathogens as well, that oral pathogens, they can do it. But if you… First big clue you have gingivitis or gingivalis is you really have bad breath.

Because bacteria causes a foul odor. So you've bad breathe and you don't know what to do, but it's always there. That's a red flag. As a clinician, if your hearing a patient's history, or if we're doing an exam and they just have really bad breaths, You really want to look at the gums, make sure they're not tethered and not swollen, they are not inflamed.

Overuse of mouth cleansers of alcohol really is devastating for the microbiome of the mouth. Dental hygiene is really critical. People have to have their plaque removed, like regularly cleaned, because plaque is where these bacteria store.

If they haven't had a dental cleaning in a long time, they can get this buildup of this pathogenic bacteria that can start to flame their gums. And once that vicious cascade sets in, these bacterias can hide in different cavities in the mouth, different notches in their gum line, and it can be very, very hard to eliminate.

So it is extremely important to have dental health. If this is just a reminder for people listening to go get a dental exam, which is like get your teeth cleaned, you should do it.

And especially as people get older, they're much, much more prone to different types of gingivitis, periodontal disease. It's a big player. Part of the reason is these bacteria produce antibodies and these antibodies can't just react.

This is one of those studies we published.

Gum Health, Chronic Infection, and Diagnostics

These antibodies produced against pseudomonas gingivalis, for example, can bind to different target proteins of beta amyloid and then create that process in nerves causing this plaque development and formation.

And I'm sure when they're seeing this association between AFib or different cardiovascular disease, I am sure some of these bacteria are binding to cholinergic receptors in the heart and causing some dysfunction in those nerve plexus as well.

Yeah, you know, I think that we just don't have enough functional dentists yet in the field to really grab this burgeoning topic. I agree. And it's nice to see some jump in.

It'd be great. We've seen a lot of pharmacists jump, in we're seeing a lots of nurse practitioners jump. In we are seeing that slow steady stream of medical doctors.

You and I both having our original doctorate in chiropractic. Chiropractors have been a baseline. because they've always thought out of the box, but I don't want to go down that rabbit hole and get myself in trouble because medical doctors take me to dinner tonight, I want them to pay the bill.

I did want get you into some rapid fire. Sure. Detese Karazi and rapid firing myths. Give me three to five myths of people who practice functional medicine.

Three misses, over supplementation, overtesting, and mnemonics and generalizations for how they practice function and protocols. So you mean to say 200 pills a day is not going to solve your problem?

It gets to the point where you just can't utilize them and it completely distracts people and really drains them. What practitioners don't realize is when you keep making wrong steps, your patient loses trust in the model and your ability to help them What does the next generation of diagnostic testing and therapeutic precision look like?

I think we're going to be much more efficient at getting very accurate signaling molecules. Like, for example, if we can start measuring things like mycokines, myokine, and extrakines effectively and reliably, that'll make a huge impact.

If we could start to look at these peptide proteins like GLP-1 and be able to measure them accurately and see what's happening with these. It's all about messenger systems.

And if can get reliable markers for messenger system, it's going change everything. your vision for the role of functional medicine in solving the chronic disease epidemic.

And if not the Chronic Disease Epidemic, how about just simply Long COVID? Well, I think Long Covid is definitely linked to autoimmune being turned on by an infection.

So, well, if you have chronic diseases, many times you end up with water When a person develops uncurable diseases, that means no one has figured out how to cure them yet.

So then your real goal in life is to try to function the best you can with what you have so then you could have a normal life and have highly functioning life, right?

So this is where functional medicine shines for the chronic disease epidemic. Now, ultimately, preventive medicine would be ideal if we can change things that can turn these diseases to turn on, but once as their solution to improving the quality of life to some degree, because the goal is to try to get these systems to work better with what they have.

As far as long COVID goes, I'll tell you what happened. When long Actually, when the COVID-19 pandemic happened, within the first two weeks, I get a call from Dr.

Vajadani. We've done some collaborative papers, and like I said, it was able to do a lot of my PhD research in his lab. And he goes, hey, Detice, just got four blood samples from people infected in Wuhan, China with COVID.

And like, really, he goes, do you want to collaborate and write some work to some research together? Absolutely. So we first wrote a paper, we published in the journal, clinical immunology, like a letter of, Hey, virus that can really turn on autoimmunity, it's going to lead to long-term problems.

We got some early blood samples as to what we saw. It's a highly cited paper now, and we actually predicted the

vaccine passport issues and all the things in this letter to the editor of the journal, which they published.

And we really thought there was a really strong autoimmune component to it. So then for a year and a half we went and got spike proteins, nuclear proteins envelope proteins membrane proteins of the virus all the different branches and then we checked over 100 tissue autoantibodies see where there is there any potential cross-reactivity for these viral antibodies in the field of immunology there's an entire specialty where it's pathogen induced autoimmunity and of all pathogens viruses are one of those strongest pathogens that can turn on autoimmune disease And the way they can show an autoimmune disease is when you make an antibody against, let's say, a virus protein, like a spike protein or envelope protein.

Those antibodies can also attach to your own self tissue proteins, which then turns on destruction against those auto immunities. So we did this study, we checked all the different proteins for the virus, and we found this profound relationship with this molecular mimicry with the SARS-CoV-2 virus and heart autoimmunity and brain autoimmune and some of the markers that lead to clotting.

We published this And it went much earlier before we started to see all these things come out, like myocarditis and neurological disease. I think with a lot of that long COVID, there I think there's going to be a percentage, maybe even a large percentage of patients that actually have a lot of COVID, where they actually develop this viral-induced autoimmunity.

And where do they have symptoms may indicate where their pathogen, the virus, or even vaccine- induced auto immunity. That's another field of study in the field where they're having symptoms.

So if they, for example, got exposed to the pathogen, or let's say a vaccine, and all of a sudden they have complete neurological deficit and can't think and have weakness and balance issues, they might want to go and check the myelin-based protein, neurofilament antibodies, like neurological autoantibiotes, see if that's an issue.

If someone started to develop different types of… there's a strong relationship between people that are on posh emotes and getting the infection. We found strong relationships between TPO and thyroid glob and cross-reactivity with SARS-CoV-2.

So I think a lot of people on COVID may not really realize that their virus may have turned on an autoimmune disease specific to target proteins. Most likely in the list that we published, we were the first people to publish that.

Read that article. And many, many different auto-immune diseases can be triggered by this specific virus.

Long COVID, Autoimmunity, and Closing Advice

I never revealed this. I mean, I read the article that there's no hidden agenda there, but I was very concerned about how the immune system was being depicted by the TV doctors.

And then I red your guy's article, and that spurred me on to write my book, Immunereboot. A little feather in your cap. So thank you very much. I appreciate that.

Interesting. And I've done a lot of blood work also. That virus, that COVID virus is gnarly. It woke up all these antibodies. Maybe you can explain to everybody why I said that getting COVID increases the antibodies in Epstein-Barr, Lyme, pneumonia, et cetera.

Yeah, there's this phenomenon with pathogens called poly reactivity. You start to make antibodies at a much higher rate for some of the viruses. If you check the population for Epstein-Barr, I'm not sure what the numbers is, but it's like 90% of people will have some Epsten-Barre antibodies from past exposures, from passed infections.

But a lot of times when you get a pathogen in, they can cause this polyreactivity reaction where you multiple antibodies elevated. Those antibodies will also have an effect on tissue.

they'll have some adverse effects on tissue. And sometimes just like when we do a panel, like we'll do like a pathogen panel with like 24 different pathogens, all of them will be off the charts.

That's called polyreactivity. So this poly reactivity can be triggered by certain infections. In this, poly activity can also be treated by cancers. It's like if we run the panel where it checks 24 pathogens at once, and if I see everything off of the chart, I know they have poly-re activity.

We have to go, is there cancer in this patient? Wow. Or is there like this active infection that's there? So that a phenomenon in immunology that is very interesting where the whole immune system just rubs up when it's under attack, especially by specific pathogens.

So what it could do can definitely cause poly reactivity in some people. I'll tell you those antibodies have been raised. They got two more for you. The biggest bottleneck in getting patients real answers, because I know that it is something that you're most concerned about.

Is it biological, educational, or is it systemic? One of the biggest complaints I get from patients is that They don't really understand what the doctor said.

They lost confidence in the medical field, unfortunately. So that idea of they're all bottlenecked and kind of funneled into one thing as opposed to really looking at the whole field.

You know, sometimes a doctor becomes myopic and you're talking about looking like the field that you said you didn't like a lot of sports. I love quarterbacks and point guards because they have to look at whole feel to be effective.

Same thing with the Doctor. That's a hard question. I have the same frustration they do. Every time I had a family member, when my daughter was born, to go to a pediatrician, it took me a long time to find the right pediatricians.

And I didn't trust anyone. Didn't do anything. Have this antitrust against everyone in healthcare, including my own bias when I read information and say things.

It's big problem because it's so complicated, so difficult. Well, I think there's few issues. First of all, if you have chronic disease, you cannot be a passive patient.

If you're a passive patient just wanting to hand something over to a practitioner, you are guaranteed to have a case of ill. Like if you have chronic disease, then you also have to become an expert.

You have dedicate some part of your time and life to really understanding the condition and disease which many patients do. I mean, there's the all-star patients that come in, they like know all about their case and then they're teaching like you as a practitioner about something like, I didn't know that.

Thank you for teaching me. All the papers and information. You're like okay, you're awesome. And you look forward to seeing them each time because they are going to teach you something and at the same time you go on a journey together.

think the key thing is when you're dealing with a chronic disease, first of all, that the patient themselves cannot be passive. They have to be an active participant.

And you should expect to have everything fail with you if you become an actor participant, and even I can tell you, even some of the top best practitioners in the world, I would go see that they're overwhelmed.

You know, they do the best But it's cases are complicated. There's being active can keep them on track to sometimes they deviate. So the more you know about the case, the better.

And also, there's got to be this trial and error. This is discussion of like working through things and figuring things

out. Like, There is no simple.

I've got the answers for you. You know, I think the key thing is don't get focused on. having the answers, understand trial and error, work with someone who's got trial there, and then involves the communication, the practices, education, knowledge in that field, but also patients not being passive and really trying to understand where they can about it.

Let's close with what's next for you. I mean, you've clearly done so much in your 26-year illustrious career, yet what most compelling is talking to you before we came on, You're still at it, man.

You still thriving. driven than you were 10 years ago. What's next? Yeah. And I would tell you, like, I just feel like man, i'm getting older. I only have so much time left and I'm just learning and just want to do stuff now.

You know, and iIm sure you feel the same way. It's like everything you've built up to your knowledge base now is just trying to make you a little more comfortable.

30, 40 more years. You've got that in the bag because you're all about health and functional medicine and all that. One thing is my friend always listens, Oxford grad in Geneva, and he always says, listen, keep it simple for me.

Give me one thing at the end of the podcast that if I had to listen that I could do tomorrow to make my life better. So I think, listen, for me, where I'm in my journey right now is I want my role is really an educator.

I've had the most profound impact teaching other physicians and practitioners health care. The CrossFit Institute has become a central part of my my life mission to just recreate educational programs that teach practitioners, because when they learn, they have an impact on their populations, which is much more profound than me working with a patient one at a time.

And the two education sources I have right now are focusing on my time, and right is the Cross Union Institute and the Academy of Fungal Nutrition and Lifestyle Medicine, Which is a more of an interesting program.

We opened that program up for also general public and practitioners. because a lot of the general public that are passive patients need to understand basics of funnel nutrition diet and lifestyle for themselves instead of being what to do.

So the program is open for practitioners and the journal public to go through. Right now, I'm just trying to really understand how they're responding to the education, what are some of their deficiencies in it, how do we optimize it and how we make it better.

That's really been my passion project. Well, keep going. Love it. Love all that I learned from you. Thank you very much. That's the number one thing that everybody told me to say to you, thanks so much for setting such a high bar and a standard.

It's not a problem. I love grabbing low-hanging fruit and climbing up the tree. We'll see you at the top. Everybody, Dr. Tatis Karazi and Rob Silverman, Proven Health Alternatives.