



# Episode #144: PANS and PANDAS with Dr. Anju Usman Singh, MD

📅 April 21 2021 📅 April 26 2021

## Why You Should Listen

In this episode, you will learn about PANS and PANDAS and approaches for supporting children impacted by these conditions.

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BETTERHEALTHGUY BLOGCASTS

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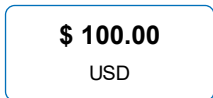
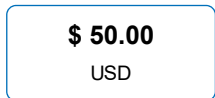
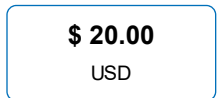
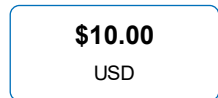
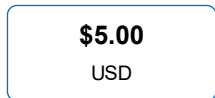
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## About My Guests

My guest for this episode is Dr. Anju Usman Singh. Anju Usman Singh, MD is director and owner of True Health Medical Center and Pure Compounding Pharmacy in Naperville, Illinois. She specializes in biomedical interventions for children with ADD, Autism, PANS/PANDAS, Down Syndrome, and related conditions. She has been involved in research regarding copper/zinc imbalances, metallothionein dysfunction, biofilm related infections, and hyperbaric oxygen therapy. She serves on the medical advisory boards for TACA (The Autism Community in Action) and Autism Hope Alliance, as well as serving on faculty for MAPS (Medical Academy for Pediatric Special Needs). Dr. Usman Singh received her medical degree from Indiana University and completed a residency in Family Practice at Cook County Hospital in Chicago, Illinois. She is board certified in Family Practice and Integrative and Holistic Medicine (ABIHM).

## Key Takeaways

- Why is immune dysregulation, inflammation, MCAS, and autoimmunity more common than ever?
- Is autoimmunity driven by a persistent infection or toxicant?
- What are the diagnostic criteria for PANS/PANDAS?
- What are some key labs used to explore these conditions?
- Can vertical transfer of infection during pregnancy contribute to PANS/PANDAS?
- How might the Cunningham Panel be used?
- What role does genetics play in PANS/PANDAS?
- What are some of the microbial support tools?
- What role do biofilms play in these conditions?
- When should biofilms be addressed?
- How might pre and probiotics help with biofilms?
- How might symptoms such as OCD, anxiety, and sleep issues be supported?
- What can be done for children with food restrictions?
- What tools support modulation of the immune system?
- Are parasites a good thing or a bad thing?

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## Interview Date

April 21, 2021

## Transcript

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**[00:00:01.06]** *Welcome to BetterHealthGuy Blogcasts, empowering your better health. And now, here's Scott, your Better Health Guy.*

**[00:00:14.14]** *The content of this show is for informational purposes only and is not intended to diagnose, treat, or cure any illness or medical condition. Nothing in today's discussion is meant to serve as medical advice or as information to facilitate self-treatment. As always, please discuss any potential health-related decisions with your own personal medical authority.*

**[00:00:34.25] Scott:** Hello everyone, and welcome to episode number 144 of the BetterHealthGuy Blogcasts series. Today's guest is Dr. Anju Usman Singh, and the topic of the show is PANS and PANDAS. Dr. Anju Usman Singh is the director and owner of True Health Medical Center and Pure Compounding Pharmacy in Naperville, Illinois.

She specializes in biomedical interventions for children, with ADD, autism, PANS, PANDAS, down syndrome, and related conditions. She's been involved in research regarding copper-zinc imbalances, metallothionein dysfunction, biofilm-related infections, and hyperbaric oxygen therapy.

She serves on the medical advisory boards for TACA, The Autism Community in Action, and Autism Hope Alliance, as well as serving on the faculty for MAPS, the Medical Academy for Pediatric Special Needs.

Dr. Usman Singh received her medical degree from Indiana University and completed a residency in family practice at Cook County Hospital in Chicago, Illinois. She is board certified in family practice and integrative and holistic medicine.

And now, my interview with Dr. Anju Usman Singh.

I am so excited today to have Dr. Anju Usman Singh on the podcast. I've been blessed to know her for probably at least a decade. I have so much respect for all that she does to help her patients, even when, at times, it might go against what is more conventionally accepted.

I really honor her, not only as a skilled and gifted doctor but as a person that has deep purpose and really makes a positive difference in our world. So thank you so much for being here today, Dr. Singh.

**[00:02:21.11] Dr. Singh:** Wow, well, thank you for having me. I'm so excited to be on your podcast. I have listened to you many times, and you do an amazing job educating people amazing. I like the way you organize your thoughts and put them out there.

**[00:02:36.14] Scott:** My OCD comes in handy from time to time. You've dedicated your life to working with children with complex conditions like PANS and PANDAS, autism spectrum disorders. How did you become interested in working with complex chronic illnesses? And particularly with children? Was there some personal experience or journey that led you to your passion?

**[00:02:59.20] Dr. Singh:** Yes, I think all of us have that kind of intuitive reason for why we do what we do. But for me again, it was my children. I always wanted to be a doctor, and I always wanted to take care of people. And so I ended

up doing my residency at Cook County Hospital because I thought if I did my residency at one of the hardest hospitals to treat patients with, I could learn a lot of stuff.

So I went there to kind of learn how to take care of really sick patients, and then my own children became really sick. My eldest daughter had peanut allergies, asthma. My second daughter has mold sensitivities and allergies, asthma, and type 1 diabetes.

My third daughter has multiple chemical sensitivities to the point she couldn't go to school or go to a public place because of her sensitivities. So trying to learn how to take care of them, I just kind of ended up in working at the Pfeiffer Treatment Center, learning about copper-zinc imbalances in children with ADD, and then the whole autism epidemic started and became involved with the DAN think tank, Defeat Autism Now.

And kind of learning from my parents a lot, learning from my patients. And just over the years, I mean, I've been doing this since 1997, so you know a long time. Yes, it's been a personal journey trying to help my kids. But in the process, I have learned so much from my patients.

**[00:04:26.03] Scott:** What are some of the reasons that we seem to have more impaired immune responses now, as compared to years past? What maybe explains the higher levels of autoimmunity of mast cell activation syndrome? Of immune dysregulation?

**[00:04:41.20] Dr. Singh:** Yes, I mean that's a million-dollar question. What is why do we have epidemics of autism? And type 1 diabetes, and childhood cancers, and our kids are so sick? One in four children have a developmental delay, and so it's really crazy, and that's the number one question. You and I know there's no such thing as a genetic epidemic.

So we definitely have to look towards the environment and the whole concept of epigenetics. How our environment plays a role in our genetics. I think that that's a big thing, we think about environment, we think about toxins. So one of the potential triggering factors for autoimmunity is the concept of the hygiene hypothesis.

Where like we have become so hygienic that our microbiome, our gut bacteria, doesn't develop in the right way. So we can develop a proper immune system. So it's called developmental immunotoxicology, where our immune system has been affected at a very early age. Our gut microbiome was affected at very early age, and it doesn't develop normally or naturally.

So we end up with some intolerance to things that we should really be tolerant to. Some of the factors in that microbiome disruption we can think about early on; here in my world with autism is maternal autoimmunity is a big risk factor. So just us moms having autoimmunity is a risk factor. Then maternal immune activation.

So, moms who get a virus or a cold during pregnancy, their immune system gets turned on unnaturally, and then that fights the baby. C-sections, antibiotics, formula versus breastfed, diet, these all play a huge role in early development of a really good microbiome, and that's very important for the development of the immune system.

**[00:06:47.04] Scott:** Let's drill in a little bit more on the autoimmunity conversation. What is it? And then, in your mind, is it an entity of its own? Or is there generally persistence of infection or persistence of a toxicant that is triggering or stimulating the immune system? Is there really a post-infectious autoimmunity, and then maybe you can touch on the concept of molecular mimicry as well?

**[00:07:12.07] Dr. Singh:** Yes. So what is autoimmunity? Basically, it's what it sounds like. Your immune system is confused or dysregulated and ends up fighting itself. So again, why would it do that? Like what's happening. Again, here is the million-dollar question, it is well, why does the immune system get confused and dysregulated and fight itself?

Some of the theories behind why it fights itself is a concept of molecular mimicry. So, for instance, in type 1 diabetes, there are some studies that show that if you have a certain type of a virus-like an enterovirus or coxsackievirus, your body fights that virus. In the process, it ends up fighting its own pancreatic islet cells.

So the protein in the virus looks a lot like the protein on your islet cells, and the body's fighting the virus ends up

fighting your own islet cells. Similar things happen with Streptococcus infection. You get a streptococcus infection; the body fights the strep.

There's a protein on strep that looks a lot like the myosin on your heart muscle, and you end up with rheumatic fever. Now we're theorizing too that in patients with PANS or PANDAS, the body fights the strep, and there are different immune cells that are stimulated, they're called Th17 cells.

They kind of migrate up through the nose, they end up hitting the basal ganglia of the brain, and they create an immune response there. So the antibodies to strep end up in the brain. There are different mechanisms for this molecular mimicry where proteins from an infection cross-react with the body's own immune proteins is a big one for autoimmunity.

**[00:09:06.13] Scott:** So what I'm hearing you say is that autoimmunity is maybe a symptom of an underlying trigger or root cause, but probably not its own condition, so to speak. That you wouldn't want to stop with an autoimmune diagnosis, but we need to understand deeper than that what's triggering that immune dysregulation?

**[00:09:28.00] Dr. Singh:** I mean, exactly. So there are these different things that trigger, and again we're talking about PANS and PANDAS. In that situation, we think that there's a potential infectious trigger for the immune system to go dis awry. However, I kind of give the analogy of my daughter with type 1 diabetes.

She was eight years old; she had a really bad virus. Six months later, she ended up with type 1 diabetes. Well, the virus is gone, but she still has type 1 diabetes. I cannot do anything to reverse her immune system from that; I don't have any tools in the literature or anything that, like people have actually discovered, that can reverse that.

But in some of these patients, where they are diagnosed with immune or autoimmune issues, there might be an underlying trigger that's still occurring that's still inciting the immune system. If we can quiet that down, and we can quiet down the immune system, then the body doesn't fight itself.

**[00:10:30.02] Scott:** So let's then move into a conversation around PANS and PANDAS; how are those two conditions different? And then some people will talk about PITAND, about autoimmune encephalitis. Are those all different conditions? Or is it also a spectrum or have some overlap between those different conditions?

**[00:10:50.27] Dr. Singh:** The terminology gets kind of confusing, like you mentioned. All of these terms were developed and coined by a woman by the name of Sue Swedo from the NIH. So if you want to learn more about this, I mean she's done most of the research, her and Madeline Cunningham. They first described the concept of PANDAS or Pediatric Autoimmune Neuropsychiatric Disorder Associated with a Streptococcus infection.

Patients would get a streptococcus infection pediatric population and then end up with these neuropsychiatric symptoms, which we'll talk about. So that was kind of your classic PANDAS. Then they started researching and finding well; it wasn't just strep that was causing neuropsychiatric symptoms post-infection.

So they came up with this term called PITAND, which is Pediatric Infection-Triggered Autoimmune Neuropsychiatric Disorder. Well, then they realized well, it wasn't just infections that were triggering these neuropsychiatric symptoms, that there's other environmental triggers. And that's where it gets a little bit hazy because they really haven't defined what those environmental triggers are.

Again, because we're talking integrative medicine, we can surmise things like potentially mycotoxins or heavy metals or other chemicals that could kind of trigger this immune reaction. So that one hasn't been defined, and these are all pediatric, pediatric PANDAS, pediatric PANS, pediatric PITAND. Now, if whatever is triggering the immune system is persistent, the immune system may end up without this kind of; with PANS and PANDAS, we call it a relapsing and remitting course.

Meaning we have a trigger; we have these neuropsychiatric symptoms; they get better, the trigger goes away, they get better. Then we have a trigger again; the symptoms come back, then you get better. It doesn't stay chronic. Well, when the symptoms stay chronic, like in the case of my daughter with type 1 diabetes, now she has type 1 diabetes, she has an autoimmune condition.

Well, in some of these patients where the PANDAS becomes more of a chronic issue, or the PANS become more of a chronic issue, we may refer to it again as autoimmune encephalitis and AE. This encephalitis, or inflammation of the brain, affects a specific part of the brain in the limbic system called the basal ganglia. So again, these syndromes are associated with basal ganglia or limbic encephalitis.

**[00:13:36.20] Scott:** And it's interesting because my observation has been that these conditions may not always be pediatric. I mean, in the Lyme and co-infection community, and mold community, I mean it seems to me like there are adults that can present with very similar conditions to PANS, for example. Would you say that that's a possibility?

**[00:13:57.26] Dr. Singh:** Yes. I mean, I do have people who contact me and give me these types of histories. Where they were doing okay, and then they now have an acute change in behavior. That's kind of my big keywords that I like to use with patients.

Any acute change in behavior? Why? Why would you have an acute change in behavior? And then again, we talk about these triggers and what happened to the brain. The term we use is a flare, so some type in an inflammatory insult. Now in adults, we can't call it PANDAS because that's not the terminology. But it could be some type of an autoimmune encephalitis that's occurring.

Or it could be even mast cell activation. And in mast cell activation, you get very similar symptoms as PANS and PANDAS. Except the trigger is more allergen-related and the symptoms kind of go away and come back very rapidly. Meaning like minutes, to hours, to days. Where with PANDAS, you get an infection, you're in this process four to six weeks, and then it remits a little bit.

**[00:15:15.19] Scott:** Let's talk about some of the characteristics or diagnostic criteria of PANS and PANDAS. At what age do they commonly begin? Do we see it equally in boys and girls? How common are they? What are some of the key things that you observe?

**[00:15:31.06] Dr. Singh:** Yes. So again, the peak onset is around six years of age. It is considered a pediatric condition, there's two to one ratio of boys to girls. It occurs in about one out of 250 children. They even say about 10% of school-aged children who have had an observable kind of group A strep infection, GAS, have neurological or behavioral symptoms post-streptococcus.

So it's not uncommon; again, the diagnostic criteria has to do with this acute, abrupt onset. Sometimes, people use the term lightning strike, where one day you're okay, and the next day you are not. So to diagnose PANS or PANDAS, there are specific diagnostic guidelines that were developed, and the diagnosis is based on symptoms, it's not based on laboratory testing. So there are what we call major criteria and minor criteria.

So there are some absolute criteria, so the sudden onset is one of the big ones. Or some kind of dynamic evolution over like a two to six-week period that we're seeing things change. So the big major symptoms are OCD, separation anxiety, and anorexia. So those are the big three. So it's like food refusal; fear of choking is a big one, fear of vomiting.

Where patients are so afraid of vomiting that they refuse to eat. Or even just kind of that inability to swallow, there's a fear involved in that. So that's the major criteria, and then there's various minor criteria. And so I'll go through some of the minor criteria, and there's some big ones here, too, like handwriting deterioration.

90% of people have a change in handwriting. So even just seeing pre and post handwriting samples can be really helpful for diagnosis. Urinary frequency or enuresis, some of these patients will urinate like a hundred times a day. It becomes so frequent. Hypersensitivity, sensory issues are big. Left-sided neglect, too, again if they drew a clock, they would draw the right side of the clock but not the left side of the clock.

Inability to concentrate are some of the other big ones for the minor criteria, emotional liability, depression, sleep disorders, behavioral regressions like baby talk. Learning disabilities, particularly losing math skills, short-term memory loss.

So the diagnosis in patients with acute onset of symptoms, they must meet the absolute criteria in two major. Then, patients who have that kind of slow onset, they have to have two major criteria and three minor criteria.

**[00:18:42.19] Scott:** And then are there some conditions that might look like PANS or PANDAS, but maybe other differential diagnosis that people need to be aware of?

**[00:18:50.28] Dr. Singh:** Yes. So again, before you can diagnose PANS, you need to make sure that it's not some other form of like an encephalitis that's occurring. The patient have a stroke, now they have left-sided neglect, or they're losing their handwriting, or they can't remember.

So some are like the biggies, is there a major exposure to some type of medication that's causing these kinds of symptoms. Sometimes psychological trauma as well, or child abuse. Again, we just want to rule all that stuff out. Sydenham's chorea if it's strep related. And then there's OCD and Tourette's that's not PANS or PANDAS. Those are like the biggies we want to make sure.

**[00:19:32.22] Scott:** So a lot of the symptoms that you mentioned are behavioral type symptoms. Are there specific things that you might see in a physical exam in a child with PANS or PANDAS?

**[00:19:44.10] Dr. Singh:** Yes. So again, we're going to try to look for some of the physical symptoms of like an infection. Because one of the other things that I know, and is noted, is that even though these patients have potential infection-triggered disease, there may have been no signs of an infection. So they didn't have a sore throat; they didn't have a fever.

They didn't really get sick, and then all of a sudden they're having OCD, separation, anxiety, and anorexia. So we could look at the body and say, well, maybe we have some clues that there's an infection going on. So some of the clues would be like peeling of the fingers and the toes, a strawberry tongue. A rash anywhere, like a sandpaper rashes, what is common in strep infections. A ring around the anus, or even just like sores around the anus.

Sometimes again, strep can grow in that area. Oftentimes, we don't see enlarged tonsils, but if we do again, strep can be hiding. Another really interesting symptom what we call piano-playing fingers, where you have them put the hands out, and it looks like their fingers are moving; it looks like they're playing a piano.

Those are some of the ones that we would think of with strap. But again, there might be other physical symptoms that, if it's *Borrelia* related, we might see kind of a bullseye rash. If it's *Bartonella*-related, we might see those red puffy stretch marks that blanch them.

If it's a viral trigger, then we might see things like sores in the mouth or canker sores, or other kinds of warts or something that would make us think that this person is having trouble with viruses.

**[00:21:40.08] Scott:** It seems to me that PANS and PANDAS are where chronic Lyme disease was maybe 15 years ago; in terms of trying to get more conventional medical care or broader understanding, I would say Morgellons is in a similar place as PANS and PANDAS in terms of it's still being very difficult to get validation from the traditional medical community.

And so I'm wondering why are these conditions still not accepted by mainstream medicine? And do you think that things are getting better in that regard?

**[00:22:11.19] Dr. Singh:** Yes. I really don't understand why something like PANDAS isn't recognized by the mainstream because the mainstream doctors actually are the ones who research this.

So like I mentioned, Sue Swedo is the head of autism research at the National Institute of Health, and she was the original one to do a lot of this research. I mean, this is coming from our own governmental agencies about this particular disorder.

**[00:22:43.11] Scott:** What are some of the key labs that you might use to explore the potential for PANS or PANDAS?

**[00:22:50.00] Dr. Singh:** So, as I mentioned, there are no laboratory tests that diagnoses PANS or PANDAS. But again, we can see some evidence of what's happening in the body based on different types of testing. So there is some laboratory testing that we can do that gives us some evidence of what's going on with the immune system.

So again, we have this immune autoimmune condition. And so the immune triggers we want to look for, so what are

some of those immune triggers? Streptococcus is a big one. So ASO titers, Anti-Dnase, B antibodies, even throat cultures or cultures of the anal area can kind of give us an idea about Strep. Then I like to look for co-infections.

Lyme, Lyme co-infection type titers, to see what's going on there with Borrelia, Bartonella, Babesia. Mycoplasma is another one that can trigger PANS. So Mycoplasma pneumoniae, Chlamydia pneumoniae, these are titers that we can kind of look at and see okay, what's going on with past infection? Is this a potential chronic infection?

We can look at things regarding the immune system. So anti-nuclear antibodies, ANA antibodies, are found in patients with autoimmune conditions, and oftentimes we'll see a positive ANA in my patients with autism and my patients with PANS and PANDAS. It doesn't mean they have lupus, but again it points towards this dysregulated immune system.

Checking total immunoglobulins, just to make sure there's no immunodeficiency or an IgG deficiency, we sometimes see that. I think that allergies are a big part of this condition, meaning when the immune system gets activated, the microglia in the brain, these immune cells in the brain get activated, and they even trigger mast cell activation.

So there's this whole kind of crosstalk between microglia, mast cells immune system, brain health. So again, doing a little bit of a mast cell work up, looking at for IgE, looking at tryptase, chromogranin A. And then looking at other inflammatory markers like saturate, ESR. We don't usually see them in this particular case, but it might point to something else.

Many of these patients also have abnormal EEGs. So checking an electroencephalogram can also be a way of figuring out what's going on. So some of the big testing that was kind of looking at okay, so we have these immune triggers, let's look at those. But then we have the end result of this immune dysregulation. We have the autoimmunity, so how do we look at that?

So there are tests like the Cunningham panel, which looks at autoimmune markers in the brain. Dopamine 1 receptor antibodies, dopamine 2 receptor antibodies, tubulin antibodies, ganglioside antibodies that shows up on the Cunningham panel.

Then there are other autoimmune antibodies like NMDA or GAD and various tests to look at autoimmune markers in the brain. Again, they give us clues, and they can kind of help guide some of our therapies and ideas and how to kind of mitigate this.

**[00:26:12.05] Scott:** With so many of the things that you mentioned being vector-borne conditions, the Borrelia, Bartonella, Babesia, and others. How commonly would you say that maybe this stage is set for these conditions in utero? Meaning that there's some congenital or vertical transfer of vector-borne infections that then serve as triggers for immune dysregulation?

**[00:26:36.03] Dr. Singh:** Again, that is a really interesting question. Because one of the theories, even with the strep infections in these kids, is that maybe mother had a Group B beta strep infection, and then it was passed on to the infant during delivery.

And the infant gets the strep infection but thinks it's itself. So the whole idea of autoimmunity is determining self from non-self, figuring out who you are, what you need to fight, and what you don't need to fight. And that's all developed in the first two years of life.

So again, these early exposures to something maybe transplacentally through like Lyme. The infant isn't going to recognize the Lyme as a problem or recognize the Strep as a problem if it's introduced at such an early age when the immune system hasn't really kind of developed its ability to fight a lot of this stuff. So those are really interesting theories.

We're not really sure why certain people have these kinds of immune autoimmune reactions like PANS and PANDAS, but there is some theory that is somewhat genetic. There's a predisposition to this, and again something in the environment allows this intolerance to these organisms.

**[00:28:02.29] Scott:** Commonly, when people think about testing for Strep, they think of doing like a throat swab or a throat culture or something like that. When we're talking about PANDAS, can the exploration for Strep be something



that needs to go further than that? Are there other sites or places in the body where we need to explore the potential for Strep?

**[00:28:23.05] Dr. Singh:** Yes. Again, doing a throat culture with Strep, that's kind of hiding in the body, where the immune system is already dysregulated. The immune system isn't able to kind of recognize the Strep, deal with the Strep in a natural way. So as I mentioned, these patients don't get a fever; they don't get a rash, they don't even have swollen tonsils.

But the Strep is there hiding and evading the immune system. And many times, these infections like lime and Strep are hiding under films or biofilms. So when we go to try to culture them out, they're hidden under this mucous layer. You can't culture them.

So sometimes, I'll even do a rapid strep because I'll find the antigen, but I won't be able to culture it out. I won't be able to culture the organism. So yes, the throat, but again these infections can be hiding in sinuses, the ears, the gingiva, the teeth, the gut, and even in the rectal area. So culturing from above and culturing from below can be helpful, but it can also potentially be false negative.

**[00:29:35.16] Scott:** In these conditions, there is some degree of neuroinflammation. Are there particular biomarkers that you look at to get some sense for how neurally inflamed the child might be? And then, if we're thinking about the chronic inflammatory response syndrome realm, Richie Shoemaker's work "Mold and Lyme" looking at things like TGF Beta 1 or C4a or MMP9. Do any of those come into play in exploring the level of neural inflammation in PANS or PANDAS?

**[00:30:05.28] Dr. Singh:** So those tests haven't really been described in like the traditional study setting, but again in the kind of the integrative or holistic approach to this neuro-inflammation, it's the thought, right? The thought is there's inflammation in the limbic system, in the basal ganglia, creating the OCD, the anxiety, the ticks, these particular symptoms.

Again, I mentioned the Cunningham panel; it can give us a little bit of clue about autoimmunity in the brain. There are other autoimmune markers, glutamic acid dehydrogenase, NMDA. But none of them are really that evident in patients with PANS or PANDAS. You mentioned the Ritchie Shoemaker testing for CIRS, and I have been doing more tests like the TGF beta 1, MMP9, C3A, C4A to kind of get an idea of immune activation.

It's not in the literature that those tests are abnormal in patients with PANS or PANDAS. But my thought would be yes, the immune system is activated in those types of patients, and these tests would be ways of kind of guiding my treatment.

So I do like to do the testing because if it's high, I can kind of say okay, we have some of these immune markers that are abnormal, then we can kind of see if these immune markers improve like TGF beta 1 or C3a and C4a in particular. Those are the ones that I probably see the most abnormal in this patient population.

**[00:31:46.12] Scott:** One of the things that, in conversations that I've had with many people over the years, that maybe isn't always understood as they maybe will have or do a Cunningham panel, have some abnormal results.

Then want to directly explore how do I treat this? Not really understanding that you then have to go into an exploration phase around okay, what are the potential triggers that led to that response on the Cunningham panel?

That you're not just treating based on the Cunningham panel, but to your earlier point that there could be mycoplasma involved or molecular will talk about how influenza can sometimes be a trigger for PANS. Or many people are talking about Bartonella as a potential trigger for PANS. And so I'm wondering do you think that lime and co-infections are common contributors to PANS?

Do you think that mold exposure from a water-damaged building can be a trigger? What do you think of when you're you've already ruled out the PANDAS piece? It doesn't appear to be Strep. What do you kind of go to in your mind as the most likely triggers for PANS?

**[00:32:53.21] Dr. Singh:** Yes, I do think that Lyme co-infections and this kind of the mycotoxin piece can be a piece.

But my experience is that most of that is probably there already. That okay, so they're in a moldy environment, or they have underlying Bartonella. But somehow, their body's dealing with it all; somehow, they're doing okay.

And then they get a cold, or they get an infection or a major stressor, or something happens, and their immune system gets triggered, and then the Bartonella comes kind of out of hiding, back to the surface. The mycotoxins become more of an issue than they were before. They're always kind of laying their persistent.

Because if you're in a moldy environment, maybe like with my daughter, she's mold sensitive, she had a Girl Scout trip, and she went into a moldy environment. She ended up on a ventilator that day. So yes, in that case, it was pretty acute, but most of our patients have been sitting in that environment for a really long time, and they're not like, their immune system is activated, they're very sick, but they're not having this okay, something just happened, and I just got worse.

So there is something where there is some other triggering event. And maybe that's kind of underlying, and now we're seeing that at the forefront. And that again needs to be treated, that needs to be dealt with because that's inciting the immune system. So it is so twitchy, it is reacting, it is intolerant. If we can get that low down of co-infections.

We can get the load down of a viral burden; we can get that load down of mycotoxins. The immune system isn't so turned on that every little thing is going to just activate it again, and we're seeing these symptoms, these neurological symptoms.

And I really think that going after something like autoimmunity and the Cunningham panel with IVIG, I mean I think in some of my patients we have to do that, but we need to rule out some of these other things before we go there.

**[00:35:11.22] Scott:** I like that term twitchy, so maybe we have immune system fasciculation syndrome.

**[00:35:16.22] Dr. Singh:** Yes, there you go. They call it TILT, total immune lack of tolerance. Where the immune system gets tilted, and we all manifest that in different ways, and these kids with PANS and PANDAS, the immune system gets tilted with Strep very easily. They can just be shut on by somebody and have an immune reaction.

And people say, well, they don't actually have an immune infection, which is true. Again, I kind of use the analogy of an allergen. So to them, their immune system is so reactive to Strep that if they're even a round strep, they're going to have an immune reaction to the Strep. They don't necessarily have an infection, but they have an immune reaction.

So it's a different kind of concept; when you're dealing with this immune autoimmune issue, this immune sensitivity, how do we kind of downregulate that twitchiness?

**[00:36:14.28] Scott:** In chronic inflammatory response syndrome or CIRS, there's discussion around certain genetic types or HLA-DR types that might be predisposed to biotoxin illnesses like mold illness or Lyme disease. What role do genetics play in PANS? And is it more the genes? Or is it the epigenetic influences of gene expression that are really driving or potentially contributing to the resulting condition?

**[00:36:43.28] Dr. Singh:** So there's not a lot of work on the genetics and PANS out there yet. Yes, HLA subtypes play a role in that predisposition. There are some genes like TNF Alpha and mannose binding lectin. Where with mannose binding lectin, you're not able to recognize the proteins on the cell membranes of these infections that well.

So those kinds of genetics are associated with a higher risk of having PANS and PANDAS. But I do think that this epigenetic piece, like again, there's no such thing as a genetic epidemic. These genes have been around forever, and the parents have them too.

But oftentimes, we will get the history, is that there's OCD in the family, there's anxiety in the family, there is autoimmunity in the family, but no PANS or PANDAS. So this is kind of a new thing in a way. Like I said, I've been working with children on autism spectrum since 1997.

I wasn't dealing with all of this ten years ago. And so there is something going on in the environment that is making our immune systems extremely dysregulated. And again, we think this is that early disruption of the microbiome from all the different things that our moms are exposed to.

**[00:38:14.28] Scott:** When we look at ways to approach treating these conditions, in some of your presentations, you

talk about dealing with the triggers using antimicrobials, treating some of the symptoms really just to improve the child's quality of life.

We've talked a little bit about the need to modulate the immune system, and then also looking at potentially the tonsils or the adenoids and so on, which we'll come back to. But let's maybe get into the microbial support piece.

So what are some of the tools that you think about that can be helpful for microbial support? Do you find that children with PANDAS or PANS respond to natural interventions? Or are pharmaceuticals more appropriate or maybe lead to better outcomes? Maybe you can talk about some of the bacterial antimicrobials to start, like for Strep and mycoplasma and so on.

**[00:39:06.08] Dr. Singh:** Yes. I mean, I think one of the reasons we're in this situation is because of the overuse of antibiotics and this concept of resistance. Again, the immune system in these patients doesn't really recognize these infections, and again when we're throwing these antibiotics at them even further, they're going to kind of produce more biofilms and potentially become more resistant.

So my approach would be yes, we definitely need to make sure that there's no chronic infection that we're dealing with that's constantly inciting the immune system. So using natural antimicrobials would be my first preference. So again, using antimicrobials for Strep, for instance, some of my favorite antimicrobials for Strep are berberines in the berberine family.

Like goldenseal, barberry, Oregon, grape root, they're very nice for Strep. Neem is another one of my most favorite herbs. It's great for strep; it's good for parasites as well. Oregano, oil of oregano, is also very good for a strep.

So we can use some of these natural agents if we have some kind of chronic tonsillitis, pharyngitis, something like that going on that we can kind of deal with. Oftentimes, I'll do some antimicrobial with biofilm busting agents, like one that I developed is called Muco-Solve, it has a little bit of disodium EDTA and like mucolytics, so you kind of clean up that film and then use the antimicrobials to delve into that film with various herbs and essential oils for things like Strep for instance.

And dealing with the bug, but then dealing with the immune system is really important; those immune modulators, those natural immune modulators, are, I think, extremely important this patient population.

**[00:41:17.17] Scott:** So I kind of think of going after the biofilms maybe as opening up all the prison cells, and the prisoners potentially being able then to kind of run out.

But when you're combining that then with an antimicrobial like you talked about, it's kind of like opening the prison cells, but having a guard at every door essentially, right? So you're not just completely releasing everything from the biofilm, but you're breaking them down methodically and then also supporting the microbial support at the same time.

**[00:41:49.10] Dr. Singh:** Exactly. So I've talked in other lectures about this protocol that I developed and the different products that I developed around, like breaking down biofilm and antimicrobials. I have a product called Biota-Solve, which is a combination of herbs and essential oils that are in a powdered form.

So you can kind of hit the water-soluble components of these infections, and the fat-soluble cell membranes and kind of get in deep and kind of clean things up. But the goal is to kind of clean things up and be done because we want to really kind of replenish that microbiome gets it back to where it was so that the immune system can kind of start acting the way it should act.

Because we can't constantly work on killing this stuff because it will come back unless we get that immune system to kind of downregulate. So yes, these viral herbs, antibacterial herbs, antifungal herbs, antiparasitic, we kind of have to think about all of them when we're dealing with these biofilm infections because we really don't know what's underneath them.

**[00:42:58.24] Scott:** What are some of your go-to antiviral support interventions?

**[00:43:04.21] Dr. Singh:** So I know we're all thinking about COVID these days, and we're thinking about how do we kill

it, and we don't really have any great antivirals for killing things like viruses. The ways we handle viruses is by modulating the immune system, helping that immune activation, that mast cell activation, helping with the inflammation.

So there are some herbs that can actually help kind of calm down the way we replicate viruses. One of my favorite ones is olive leaf extract. I really like olive leaf extract for kind of, it helps to prevent viruses from being assembled. I also like monolaurin, which is one that helps with viral replication as well.

And then the various mushrooms are very nice for immune modulation when it comes to viruses like cordyceps, and then licorice root is a really nice antiviral, which also has anti-inflammatory properties, and it's also an adaptogen. So it helps with adrenal support.

**[00:44:13.00] Scott:** Once a child with PANDAS or maybe PANS recovers from their condition, do you commonly find the need to pulse antimicrobials over time?

Particularly if they're back in a school setting and they're getting exposed to lots of other children and have the potential to get re-exposed to strep, or whatever their trigger was. How common is it to need ongoing antimicrobial support?

**[00:44:36.19] Dr. Singh:** So even in the studies in prophylaxis with PANDAS, if patients have had like more than four PANDAS type flares in a year, they do recommend prophylaxis. Again, in the regular literature, prophylaxis would be something like chronic antibiotics or pulsed antibiotics with azithromycin twice a week for years.

They even say through adolescence. So again, if we have a child who is frequently getting shed on or frequently getting into these flares from other individuals at school, then using herbs to help kind of mitigate that initial strep hit can be helpful.

But again, just to kind of reiterate, really working on that immune system, vitamin D is really helpful. Zinc is really important for modulating the immune system. And then some of these patients will even use something like Low-Dose Naltrexone to help modulate the immune system. Things like IVIG, even LDA, and LDI can be helpful just to kind of keep that immune system quiet.

We sometimes even use LDI to strep for that, just to kind of say okay, I'm overreacting to strep, let me give something to kind of calm my immune system reaction to strep down. So I find those kinds of things very helpful. We used to be able to even use things like peptides, but the FDA doesn't like us using those types of things anymore.

So these concepts that you're mentioning, yes, they're very important. But it has to be individualized. I think again you're getting sick a lot; yes, we might need some prophylaxis for that person.

**[00:46:25.20] Scott:** I like coming back to the biofilm conversation just for a minute. Do you generally find that it's best to address the biofilms from the very beginning of treatment? Or do you like to go after the low-hanging fruit?

Start putting in some of the microbial support, and then come in later after the majority of the microbial burden has been addressed and then start breaking down the biofilms. Where does it fit from a timing perspective in your protocols generally?

**[00:46:52.21] Dr. Singh:** And we do what you just said. I kind of test the waters first with the natural antimicrobials, and again in my protocol, I like to kind of work on the biofilm. And in this case, we wouldn't be opening up the biofilm, but we would work on some of those natural kind of ... like soft biofilm busters.

The soft biofilm busters like apple cider vinegar, or these, I talk a little bit about these polyphenolics, even olive oil can be a soft biofilm buster, prebiotics and probiotics form something called synbiotics. They also help with biofilms, and these kind of natural iron-chelating compounds like green tea, curcumin, they all help with biofilms.

A lot of the spices we eat, the herbs we eat, so we're constantly breaking things down like this and opening things up. So using these types of things early on, see where we get. If we're still getting these recurrent infections, yes, I'll go in with a six-week protocol to kind of clean things up and then go back to what I was doing again. As you mentioned, it can be hard on the body, you're opening up a can of worms.

**[00:48:03.27] Scott:** Yes. And it's interesting because one of the things I've seen too is if you're really aggressive with

the biofilms that for some people, that can then trigger the mast cell activation, right? You're releasing metals and all these other things, and thus their inflammation then goes up.

So I like how you talked about a lot of the things that are kind of tiptoeing into the water, so to speak, around things that are not going to be the hammers right at the beginning. I wonder what you think of cistus tincture or cistus tea that's one of the things Dr. Klinghardt talks about that maybe is a little more of a selective biofilm breaker. Is that something that you've used in any of your kids with PANS or PANDAS?

**[00:48:41.29] Dr. Singh:** Yes, I've used a lot of cistus tea. They do well with it. And again, I think it's more of that kind of a ease into the water kind of approach with some of these kinds of polyphenolic herbs and oils. Patients tolerate it pretty well.

And going back to that kind of, that concept when you're going to break this stuff open, and you're going to try to kill some of these bugs. I think another concept is that concept of binders, and that many people don't realize we can go in and we can do antifungals and antimicrobials.

But what's being released, lipopolysaccharide, ammonia, dopamine, opiates, all kinds of stuff is coming out of these bugs, and it's nice to have a binder on board and some liver support to kind of make sure the body can handle it because we do not want to trigger again the immune system. So the immune system sees them, gets turned on, the microglia get turned on, mast cells get turned on.

So again, I talk a lot about things to calm down microglia, what can be done to calm down mast cells. Because having those kinds of herbs on board and things on board. Buhner talks a lot about that. I mean, a lot of the Buhner herbs are actually anti-inflammatory, they're not necessarily for Lyme, they're for that cytokine response or that mast cell response to these organisms.

**[00:50:09.07] Scott:** Like the Japanese knotweed, I know it's one that works well in people with Borrelia, but it's hugely anti-inflammatory. In some cases, if you're thinking about infections in biofilms but maybe not completely ready to start breaking down the biofilms.

Is there a place for things like essential oils or maybe colloidal silver or even frequency-based modalities where you can potentially get into some of that biofilm without really breaking it down at the early stages?

**[00:50:39.27] Dr. Singh:** Yes. I mentioned essential oils, and in particular, in my product Biota-Solve, I put oil of oregano oil, of thyme. I put lemongrass oil, which the studies on lemongrass oil, it pretty much hits most microbes, there's not one microbe they found that it couldn't really deal with. And it didn't really hit the human microbiome that much.

In countries where I'm used to, we use a lot of these types of things in our everyday cooking. And it's not like we have dysbiosis because we're using a bunch of garlic and ginger in our everyday cooking. So I really think that these softer strategies, especially in my pediatric population, can be very helpful again to kind of modulate that microbiome, modulate that immune system. I'm not that familiar with frequency-based therapies, but I do like homeopathy as well.

As I mentioned, the LDI concept of trying to kind of get the immune system to calm down to a bug. However, it's a little tougher to implement. So I think with the homeopathy, you have that same kind of concept.

You're trying to kind of get the body and the immune system to say, okay, I can deal with you better; I can handle this. And in homeopathy like cures like, so we're giving a diluted substance of the problem in essence.

**[00:52:13.10] Scott:** I'm a big fan of homeopathy as well, and also a big fan of LDI. I've seen both of those tools to be tremendous. One of the things that you mentioned for biofilm support that I hadn't heard a lot of people talk about is this idea of pre and probiotics.

So when we're thinking about prebiotics, what are we talking about? What are some of your favorites? And is it that the prebiotics and the probiotics are balancing the broader microbiome? Or do they have some effect against the biofilms themselves?

And then when we talk about the probiotics, are you using more spore-based or soil-based? What are you finding helpful in the pre and probiotic realm?

**[00:52:52.16] Dr. Singh:** So yes, this combination of pre and probiotics make a synbiotic, and synbiotics in the research actually help to break down pathogenic biofilms. So them and themselves are kind of a way of clearing biofilms.

So the prebiotics have kind of gone to the forefront of what we're using nowadays to kind of help re-balance or restore that microbiome. Initially, we used a lot of probiotics. But again, when we're talking about a patient with autoimmunity, sometimes the autoimmunity to self-kind of goes into that world of probiotics where when they take probiotics, they have an immune reaction to the good bacteria.

So many of these patients don't do extremely well with probiotics, and so we have to be careful. Some of these patients don't do well with strep, strain, probiotics either again because of this kind of immune reactivity to potential strep, even though it's good strep. So we have to be careful a little bit with probiotics. I do like the spore formers in the fact that they do have some mucin degrading capabilities. So they do help a little bit with biofilm.

They also help with LPS, lipopolysaccharide, which is released when these bacteria die. And they release them anyway, so they create an inflammatory reaction in the body using things like LPS, especially gram-negative bacteria.

The spore-formers also some of them produce beta-carotene, deep into the small intestinal lining, into the small intestines. And act as antioxidants. And they're really well-tolerated in this population of patients too.

**[00:54:47.19] Scott:** So these are things like the bacillus spores like Thrive probiotic, or MegaSpore probiotic, or something along that line, right?

**[00:54:56.07] Dr. Singh:** Yes. Again with my company, "True Healing Naturals," we developed one that has four strains and 50 billion in one. And I've been really happy with the spore formers in terms of probiotics. There is some studies to show that recurrent streptococcus infection can be mitigated with a form of strep called strep salivarius, K12 strain.

And they have had that strain available like a lozenge. So I like to give that one to family members that might be carrying strep. And so if the family member took that, it could prevent them from then giving or potentially spreading strep to the family member with PANS and PANDAS. You asked about prebiotics too.

So prebiotics are basically fiber, they're soluble fiber. And what happens is the good bacteria in the gut break that fiber down and make short-chain fatty acids. And the short-chain fatty acids help to heal the gut lining. Especially, the most famous one is called butyrate.

And they find that this short-chain fat not only helps heal the gut, but it has far-reaching potential, it has epigenetic potential, and it helps immune modulate the body. It also helps with gene expression. There have been some studies to show it actually helped with language in some of my patient population.

So we really want to get butyrate and some of these short-chain fats back in balance, and prebiotics are a good way to do that. There's different types of prebiotics, and they do different things.

**[00:56:40.21] Scott:** I love that. I had my IV sodium phenylbutyrate yesterday, and I've had my oral butyrate today, so I'm feeling like I'm on the right track based on your comments there.

How much overlap is there between biofilm and hyper-coagulation or excess fibrin in the body when we're using something like Boluoke, which is Lumbrokinase or Nattokinase for coagulation? Are we also, to some extent breaking down biofilm?

**[00:57:09.20] Dr. Singh:** Oh yes, 100%. Again, some of these films around infections are more mucus or, like we would say, saccharides sugar.

But some of these films that can grow in areas through, even near the endothelium, through the blood system, have to kind of stick there a little harder and are covered more in this kind of fibrin plaque.

So some of the theories behind even atherosclerosis and plaque is that there's some infection underneath all that. Using things like these fibrinolytic helps with coagulation blood flow. But they're also extremely helpful for these biofilms.

**[00:57:56.29] Scott:** You've talked about iron chelators potentially being helpful in biofilms, things like green tea, curcumin, for example. There is an aspect of heavy metals that are part of these biofilms as well. So do you generally find the focus on iron chelation is more beneficial or is it essentially any heavy metal chelator that can also be helpful in reducing biofilms?

**[00:58:20.22] Dr. Singh:** So, even though again, when you're looking at various studies on biofilms, they talk about calcium, magnesium, and iron sitting in this extracellular matrix that's negatively charged mucous, and this calcium, magnesium, and iron being positively charged holds it together. So these are divalent cations.

But I think in a toxic individual, lead, aluminum, cadmium also divalent cations could kind of serve that purpose. So when we're talking about things that kind of open that up, the literature says, well, we can use iron-chelating compounds to pull the iron out. But I think some of these other chelating compounds, calcium EDTA, for instance, or EDTA, can pull iron as well.

DMSA, DMPS also have been shown to help with biofilm breakdown. So yes, you can use these other chelators; the mechanism isn't as clear as the other ones. Another iron-chelating compound that people are using more often is bismuth.

Bismuth also helps with iron metabolism and can potentially help with sulfur SIBO, and could potentially help with various biofilms.

**[00:59:43.28] Scott:** Another tool that you've talked about that can be helpful for biofilms is chitosan, which I historically have thought of as a detox agent. Dr. Ann Corson talks about chitosan being very helpful as a binder.

And so I like the idea of using things that are kind of hitting multiple, two birds with one stone or multiple checkboxes, for example. So when we're talking about chitosan, are we getting support for detoxification, but then also getting some additional biofilm control with the chitosan products?

**[01:00:16.09] Dr. Singh:** Yes. In particular, chitosan can be very helpful for streptococcus biofilms. So there is some research on that. So they can be helpful; just be careful with chitosan because of the potential for allergy, with the shrimp, the shellfish allergy.

**[01:00:36.06] Scott:** You mentioned polyphenols, so these plant polyphenols can be used to help balance the microbiome as well. Are they also helping with biofilms? And what are some of the top few polyphenols that come to your mind that can be helpful in these conditions?

**[01:00:51.11] Dr. Singh:** Yes. So there's a lot of research on these, like these plant polyphenols and biofilms. So these plant-based polyphenolic substances are foods that most people eat every day. Again incorporating more of those into somebody's diet like oregano, sage, thyme, lemon balm, rosemary those are the biggies.

**[01:01:15.24] Scott:** So I know you have your gut biofilm protocol that has multiple steps where you're bringing in enzymes, you're bringing in the polyphenols, the antimicrobials. You're using binders, you're doing things to really help restore the microbiome, restore the gut.

I want to hear a little bit about some of the tools that you've put together to support all of this. You've mentioned Muco-Solve and Biota-Solve; you have the True Bio-Spore, the Prebiome-Solve. Which for people listening, Dr. Singh did not ask me at all to bring any of these up. But I really think she has some fantastic tools here.

So I want to just have her touch on them so tell us a little about those tools. And then are these products or supplements that are available to anyone, or are they through healthcare providers only? How can people learn more and get access to these?

**[01:02:03.05] Dr. Singh:** Well, thank you for asking me. I'm kind of shy about talking about my products a lot of the

times because I love the science, and I like to talk about all of this that we've been talking about. But I'm really excited about the products that you mentioned. So yes, in the past, I had developed a product called Biofilm Defense.

I tweaked it a little bit and kind of try to do a few different things with it. So this newer product, called Muco-Solve, has a little bit of disodium EDTA in the product, as well as the fibrinolytic, and the mucolytics and the disaccharidases, and the saccharidases. So that's kind of my biofilm busting agent that I have available.

And then, I mentioned the Biota-Solve; the Biota-Solve is my antimicrobial agent. Right now, it's kind of geared towards yeast and bacteria in particular. And it has Neem, berberine herbs, oil of oregano, oil of thyme, lemongrass oil, and grapefruit seed oil in a powdered form. So you're not taking the oils, they're not as caustic.

They're not as harsh to take, and you can still take them orally, and kind of have a good effect in the gut. So yes, step one is breaking down that film with the mucosal on an empty stomach. Fifteen minutes later, we take our antimicrobial. And then, an hour later, we use our binders. I use different binders based on different things, so I don't have a particular binder protocol or product yet. But there's various binders out there.

Then in terms of the restoration, the TrueBio-Spore that, the spore-forming probiotic, and then I'm really excited about the prebiotic, it's called the PreBiome-Solve. It has a little bit of GOS from acacia fiber; it has a little bit of PHGG or partially hydrolyzed guar gum, which helps with constipation. A lot of my patients have constipation, and I don't want them to get constipated on the fiber.

It has a little bit of fenugreek, which is an Indian herb. It has a bitter effect, so the bitters help the bile and the liver, and it's a bit anti-inflammatory. And then it has a little bit of a arabiogalactan, which helps to modulate the immune system from larch.

And then a little bit of insoluble fiber from flax seeds, because I kind of like that insoluble fiber to kind of act like a toothbrush inside the gut, to kind of clean things up. Usually, I'll try to work on like a six-week biofilm protocol and then try to get those prebiotics in there. Because if I give those prebiotics too soon, they sometimes feed the bad bacteria too.

So I'm not a huge fan of FOS, a lot of my patients have SIBO, and they have trouble with the fructo oligosaccharides. So like, I kept those out of my prebiotic product. So they are available publicly, the company name is called True Healing Naturals, and you can get it from their website. They're also available online, not just Amazon.

So there are other companies that are selling them Pure Formulas and some other companies that sell their products. Or you can even call my compounding pharmacy, which is called Pure Compounding

Pharmacy in Naperville. I just want to mention, since you asked me, I just want to mention two other products we talked about mast cells.

I developed a mast cell product called Aller-Mast. It has a various mast cell stabilizers, but one of my favorite in there is moringa. Which is an herb from India which is high in antioxidants, high in anti-inflammatory, and it's also a mast cell stabilizer. Milk thistle is also in that particular product because it's also a mast cell stabilizer; who wouldn't know?

And skullcap, which is a mast cell stabilizer as well as an anti-inflammatory. So there's some other things in that one, but I like that a lot too, especially this time of year. And then mast cells always cross-talk with microglia. And so the microglia, we want to keep quiet too. And so some things to kind of help stabilize microglia.

Things like green tea, resveratrol, there's some ginkgo in there. But my favorite piece of that particular product is Astaxanthin, which is a really great fat-soluble antioxidant that helps to stabilize the microglia. And there's some Ashwagandha in there, too, just to kind of calm down that nervous system. So those are my favorite things that, luckily, I get the chance to talk to you guys about.

**[01:06:54.06] Scott:** Yes. I'm so excited actually to explore your products more personally because I think they're amazing. I don't know how you are the amazing doctor that you are, and still have time to formulate these. I mean, I know to some extent, you really probably did it out of necessity, right? That you needed these tools to support your patients, and so I'm definitely excited to learn more about that.



Let's talk a little bit about some of the symptom management tools. So while you're treating these underlying issues or triggers and we're dealing with things like OCD or tics, anxiety, aggression, sleep issues, mood issues, irritability.

Let's talk about a few of your favorite tools that just help with quality of life while you're dealing with the longer-term treatment type process. So when we think about OCD, what are some of the top things that can help calm down that OCD?

**[01:07:44.17] Dr. Singh:** When I think of OCD, I think of the neurotransmitter glutamate. So glutamate gives you a good memory, but you kind of get stuck in that those memories, and you may perseverate over those memories and think about them over and over again and become very rigid.

So one of my favorite things for OCD, and it's a really tough one, I would think that like OCD and anxiety are kinds of the bane of my existence in terms of my patients. I mean they're really tough to crack sometimes. So NAC, N-acetylcysteine, studied out of Stanford with Dr. Hardin, they gave 2400 to 3600 milligrams of NAC, and it was very helpful for things like ASD, Autism, and OCD, that's a big one.

It takes glutamate and adds glycine to it, and it makes glutathione. So when you take NAC, you can help with OCD, but you can also help your liver, and you can also help with detoxification. So it's a really nice one that I really like. The other one for OCD that can be very helpful is lithium orotate. So we talk about glutamate; glutamate has a receptor called the NMDA receptor.

So lithium can block that NMDA receptor. So lithium acts a lot like magnesium. So lithium is very calming; it helps with anxiety, it helps with mania. So again, we're not talking about lithium the pharmaceutical; we're talking lithium the nutraceutical, kind of the nutrient version. So Lithium orotate is another good one for OCD. And so any of those other kind of anti-glutamate type modulators; Taurine, Glycine, Pycnogenol those can also be helpful for OCD.

**[01:09:36.26] Scott:** I know you've also talked about passionflower and Ashwagandha for OCD as well. The NAC is interesting because my understanding is NAC also has some anti-biofilm properties.

And so I'm seeing again like, okay, something that's checking multiple boxes in a treatment protocol which is often appealing. Is there a difference in OCD as compared to anxiety in terms of some of the things that come to mind, to kind of calm the mind, calm the nervous system? What are some of your favorite tools in the anxiety realm?

**[01:10:07.19] Dr. Singh:** Yes. And I think there's some overlap, because again, when we talk about OCD, we're talking about potentially glutamate, and then glutamate breaks down to GABA, and GABA is kind of our natural chill pill, I call it. So GABA is very relaxing, valium and the benzodiazepines are all kind of upregulate GABA in the brain, and that's how they calm the system down.

So when we think of things that help with anxiety, we are kind of thinking of things to kind of upregulate GABA, maybe upregulate serotonin a little bit as well. So yes, even the things that help with OCD may potentially help with anxiety.

So like the passionflower, the ashwagandha things like chamomile, lemon balm, very calming. CBD can be really helpful for patients with anxiety, and I like to use CBD for that. In terms of nutrients, 5-HTP, L-theanine, GABA are probably like the big go to the top three.

And then we want to up regulate GABA production by using things like B6 and magnesium because that pathway between Glutamate and GABA is B6 and magnesium-dependent.

**[01:11:23.04] Scott:** You mentioned earlier the impact of these conditions on the limbic system. And so in adults, a lot of times we have a focus on limbic system retraining things like DNRS with Annie Hopper, or the Gupta program with Ashok Gupta, or maybe Stanley Rosenberg's vagus nerve work, to really calm the system, to promote healing, to calibrate that sense of what is an actual threat versus a perceived threat, and those tools can be really helpful. So when we're talking about children, are there tools in that realm of the limbic system, the vagus nerve, that can be used and work well in kids?

**[01:12:02.24] Dr. Singh:** Yes. I mean, I know that there are some people who use like the vagus nerve type of stimulation, or different even like Alpha-Stim or neurofeedback that can be helpful to kind of upregulate the vagus nerve

and down-regulate the sympathetic nervous system.

Not a lot of our patients have done some of that like neural retraining type of, Dynamic Neural Retraining type of protocols because most of my patients are on the autism spectrum and non-verbal. But the whole concept of that is extremely helpful.

I mean, our patients get stuck in fight and flight, and whatever we can do to kind of re-regulate that, it's just hard to find some of those really helpful tools. There's some kind of interesting strategies that are out there. I think they're still in their infancy, but this idea of PTSD, where we've had this major trauma, whether we know about it or not, a stressful incident.

Even from an infection or an illness, and then we get stuck in that trauma, we can't get out of it. And so I think that there's going to be some newer tools available to kind of get people out of that; I'll mention ketamine, is one of the biggies that people are talking about now. I don't have much experience with it, but I've been kind of researching it because it could be one of those potential things that can help with that issue.

**[01:13:38.08] Scott:** Sleep is another key issue and one that I'm always personally trying to improve to get deeper sleep, better sleep. What are some of the tools that are helpful in kids with PANS and PANDAS to get that really critical rest that's required for healing?

**[01:13:51.28] Dr. Singh:** Sleep is huge. It's a huge one. Having first of all good sleep hygiene, a lot of our patients are kind of obsessed with electronics. So getting the electronics out of the bedroom, and the whole concept of that sleeping sanctuary, shutting off the Wi-Fi, shutting off the routers at night. Trying to downregulate that nervous system.

Getting rid of the lighting, and all that, creating a routine, I think, is a really important piece for them. Then there are certain supplements that can be helpful to kind of calm the nervous system down at night. GABA can be helpful at night, even a little extra 5-HTP. Melatonin is a really nice one. Melatonin, people think of melatonin, and they think of sleep, of course.

But we know that also melatonin is helpful for viruses. It can also bind aluminum in the brain, it's one of the only chelators that we know of that can clear aluminum from the brain. And there's more melatonin in the mitochondria than there is in the brain. So it also helps with mitochondrial function and its antioxidant abilities. So I'm a huge fan of melatonin.

**[01:15:13.17] Scott:** Yes, melatonin is my drug of choice, and I've said that for many years. I don't think there's a day that's come in a long time that I haven't used melatonin. Let's talk a little bit about tics; whether they're vocal tics or motor tics, those are not uncommon in these conditions. What are some of the tools that can help to calm those tics while you're working on some of the underlying triggers?

**[01:15:38.04] Dr. Singh:** Yes. So I think with tics, the question I have is again, what's causing the tics? Because I can't say that I have like oh, here's a vitamin, here's a nutrient that kind of clears up tics. And so again, looking for the underlying triggers. Oftentimes it's allergy-related. So making sure we have a good allergy type workup, so especially things like food allergies and environmental allergies, and mold allergies.

So mold sensitivities is as big that I've seen as a potential cause for tics. I tend to use; my patients are kind of, their symptoms are exacerbating or getting worse, or we use a term a flare. Where we're doing okay, and then all of a sudden, the OCD, the anxiety, the tics kind of pop up again. And I'll do what I call a Flare protocol to kind of calm that down.

Where I'll use something like Ibuprofen three times a day for seven days. I'll give them an antihistamine. An antihistamine that can actually get into the brain that clears histamine and calms down those mast cells. And something like a Benadryl or hydroxyzine. I find even just those two things can be very helpful for tics.

**[01:17:05.04] Scott:** So it's interesting, then it comes back to the neural inflammation, it comes back to the mast cell activation. It sounds like some of the tics is related to the level of inflammation, and being able to calm that down can be really helpful.

Let's talk a little more about the food restrictions, and you mentioned sometimes there's a concern about gagging or concern about vomiting and so on. I was wondering if there's also sometimes issues with texture, or is it that they're really sensitive to particular foods.

Is there some aspect of these conditions that overlaps with an eating disorder? For example, you mentioned the term anorexia. And then what can we do to help when kids do have these challenges with consuming food?

**[01:17:45.13] Dr. Singh:** So food becomes a big issue in this population because they're really picky eaters. Some of the OCD, like you mentioned, is around various textures, sensory issues, moisture even the look of the food; they won't eat anything that looks green or looks a certain color. So it gets really difficult to kind of find choices and foods.

In my patient population with autism, we use a lot of the dairy-free, gluten-free type diets because the dairy and the gluten, I consider extremely pro-inflammatory. And again, we think of these kinds of conditions like PANS and PANDAS as a neuro immune-inflammatory condition, similar to what we see in autism.

So a dairy-free, gluten-free, sugar-free that's kind of where I start with kind of let's try at least get some of that out of a diet because it can actually cause some of this inflammation to get worse. Another big piece with diet are foods that are called excitotoxins. Excitotoxins can stimulate that glutamate even further.

So things like caffeine, MSG, monosodium glutamate, that can trigger glutamate. High fructose corn syrup can be very excitotoxic. Red and yellow food dyes, nitrites, and sulfites. So again, in this population, we really want their diet to be pretty clean as possible. Dairy-free, gluten-free, sugar-free, organic hormone-free, antibiotic-free.

So again, in a picky child, it gets really hard with some of these sensory issues to figure out how to feed them adequately. But when we deal with some of these underlying issues, the palette expands, the palette opens up quite a bit. Especially when we work on gut issues. And zinc is really helpful for like some of the texture sensitivities and the sensory issues in the mouth; zinc is a potential big therapy for that.

**[01:19:56.23] Scott:** It's interesting with the zinc too, because I've heard in traditional anorexia that zinc can be very helpful. And then we know from Dr. Klinghardt's work that a lot of people, particularly in the Lyme arena, but also in other conditions that overlap with what we're talking about, can have Kryptopyrroluria or KPU that then depletes the zinc. And so sometimes it can be an indication of some zinc deficiency associated with Kryptopyrroluria, correct?

**[01:20:23.27] Dr. Singh:** Oh yes. I was medical director at the Pfeiffer treatment center for eight years, so I did a lot of Carl Pfeiffer's type of work with pyrroluria, that he called it pyrroluria. But this concept of when you're under a stress, or you have issues with metals and toxins, you produce these pyrroles, kryptopyrroles, and they have an affinity for B6 and zinc.

And the more you're under stress, the more you lose the B6 and zinc. That particular patient population is extremely sensory. So they're like very sensitive, they are extremely sensitive to touch, they're sensitive to light, they're sensitive to odors, and they're just those really sensitive we call them like the porcelain doll type of people. Like they have the porcelain doll fragile kind of demeanor, and they, in particular, do extremely well with things like B6 and zinc.

**[01:21:19.01] Scott:** And I'm smiling in part because I have periods in my life where I can relate to those things. One that we didn't mention but is also common is not being able to tolerate the tags in clothing, right? Wanting to cut the tags out because it's just like a constant irritator.

Looking at a lot of the things that we talked about relative to helping with OCD and anxiety and sleep, some of the overlap that I saw and what you were sharing were things like ashwagandha and skullcap, lemon balm, passionflower, chamomile, magnesium, GABA, theanine.

So I love that there are these tools when we get into the more nutrient herb kind of realm that can really help with lots of different things and kind of keep the protocols as streamlined as possible. As we start wrapping up our conversation, I want to touch a little bit more on the immune system modulation, some of the tools that you find most helpful for that immune modulation.

You mentioned, for example, IVIG as a potential tool; what are some of the immunomodulators, maybe even in the

natural realm as well, that you find can help address or calm down that immune dysregulation that you see in kids with PANS and PANDAS.

**[01:22:28.14] Dr. Singh:** So I think we hit on most of the ones, but again for me, seventy percent of our immune system sits in the gut. So anything we can do to kind of replenish that microbiome and modulate that microbiome can be super helpful for immune modulation. Zinc is a big one; getting those vitamin D levels normalized is another big one.

Things like vitamin C can be very helpful for immune modulation. Vitamin A as well. Sometimes I do a high-dose vitamin A protocol, where I don't give vitamin A every day, but I kind of do like a month's worth of vitamin A all at once. Because when we kind of flood the system with vitamin A, it helps the immune system, especially with viruses.

A, C are really good D, zinc. So those I consider foundational. Like they don't have a huge impact, but if you don't have them, you're getting sick a lot. So we kind of need those in somebody with these chronic immune issues, probiotics, and prebiotics. Then there are some other tools that we have. In regular medicine, the way I was trained when we have an autoimmune condition, there wasn't a lot of tools we had.

We have steroids, and now we have biologics, and we have things like IVIG, and those things have potential pretty serious side effects. So before I go there, I'm going to kind of think about peptides that we might be able to use. I think like BPC 157, or I don't think Thymosin-alpha 1 is available anymore.

But those kinds of peptides that are available can be helpful to modulate the immune system. Macrophage-activating factors can be helpful for modulating the immune system. I mentioned low-dose naltrexone and LDI, and LDA.

**[01:24:29.08] Scott:** And it's interesting to me too, the low-dose naltrexone. I was just listening to a lecture earlier today with Dale Bredesen on low-dose naltrexone. So I think so many of the things that trigger, whether it's autism or chronic Lyme disease or later in life, more neurodegenerative conditions or cognitive decline in Alzheimer's.

There's so much overlap when we look at the infectious triggers, the toxicants, the toxins, all of these things. And it's interesting that low-dose naltrexone seems to have application in essentially all of or many of those conditions.

**[01:25:02.16] Dr. Singh:** Yes. So even in my population, it can be very helpful. I wish it was more helpful than it is. But when we use it, and it's helpful, it's a really good intervention.

**[01:25:21.21] Scott:** In your kids that are dealing with PANDAS, maybe even PANS, but I'm guessing more PANDAS. How often do the tonsils need to be removed or treated in some way to really get a hold of the condition?

**[01:25:34.08] Dr. Singh:** So again, as I mentioned, if a patient is having these frequent infections and it's triggering PANS like four times a year, then I'm going to really kind of urge the family to have an ENT take a look at them and think about removing the tonsils.

The adenoids are oftentimes enlarged too. So any child with recurrent infections probably needs a really good ENT exam just to make sure there isn't any source of hidden infections. The gingiva, the teeth, the tonsils, the adenoids.

We want to make sure there's no like hidden chronic infection. So it's quite common for my patients who have this kind of recurrent flares to get their tonsils removed.

**[01:26:24.11] Scott:** We talked a little bit about parasites earlier in the conversation. Some practitioners feel that parasites should be aggressively treated. Others actually use specific parasites to rebalance and address the immune dysregulation, the whole conversation we were just having about immune system modulation.

Have you found the use of helminthic therapy or parasites that promote balance between Th1 and Th2? Have you found that helpful in your PANS, PANDAS kids?

**[01:26:54.17] Dr. Singh:** So I think you know how we go through different phases with things. So the use of things like HDC, we were using them a little bit more in the past. So yes, in terms of immune modulators, there has been a little bit of research using things like HDC, which are the helminths.

The problem with them is that they have to be acquired pretty fresh, and you have to take them frequently. So

sometimes we start using things, and then we stop. But I haven't been using them that recently, because again, with COVID, it's hard to get the shipments of things on time.

But again, in some of these patients where we're having a really hard time, these types of therapies can be helpful. The concept of killing parasites, I do think, can be helpful as well. So before I would go to giving helminthic therapy, I would try to do some type of a parasite protocol.

And especially in patients with like mast cell activation and histamine issues, that can be a big problem. So doing that first, and then putting in the HDCs.

**[01:28:09.22] Scott:** What are some good resources for people that are listening that resonate with this conversation, that need to learn more about PANS and PANDAS for their own children, and when is your book coming out?

**[01:28:21.21] Dr. Singh:** Oh man, if you know a writer that can help me. So there is a resource called the PANDAS Network, which can be helpful. And then there's the PANDAS Physician Networks, too, that I find pretty helpful as well.

I think there's different organizations out there that, like on Facebook, there's a PANS and PANDAS type groups out there too, that I think a lot of our families kind of find who they need to help support them.

But the PANDAS network is a really nice place to go because they're pretty broad, and they're pretty open-minded about what they're going to put out there.

**[01:29:00.18] Scott:** And I know the documentary film My Kid is Not Crazy, I believe, that's a really great film, just for people who don't have really any perception of this condition. I remember going to a local theater a few years ago when it came out and watching it, and it was just so powerful.

I actually cried through parts of it when you see how much these children's lives and their parents and their families are affected by these conditions for people who have not had experience with them. To be able to see that in this documentary is really powerful.

My last question is the same for every guest, and that is what are some of the key things that you do on a daily basis in support of your own health?

**[01:29:42.12] Dr. Singh:** Wow, that's a good one. So doctors aren't really great patients. But let's see, I try to eat healthy. I cook a lot, while I'm talking to you I'm drinking my Tulsi and Ashwagandha tea.

So I think nutrition wise I do a pretty good job; I take some of the supplements that we talked about. I mentioned I have a compounding pharmacy, so I actually compound my own protocol to take as well. I try to exercise, and I like to do Qigong.

**[01:30:14.20] Scott:** Beautiful. I think you have me beat there with your tea. I've got some electrolytes, and I've got some trace minerals, but your tea sounds pretty great too. I saw one of your talks recently, and at the end, you said thanks for being brave.

And I think that statement fits you so beautifully, leading the charge for kids when it was really not welcomed by the world at large. So I just want to thank you for being here. I want to honor you for all you do, and I want to thank you for being brave, Dr. Usman Singh.

**[01:30:48.01] Dr. Singh:** Oh, that's so sweet. Well, thank you all for listening, and thanks for having me on this podcast of yours. We're all in this together, so we have to support one another and take care of each other. So, thank you very much.

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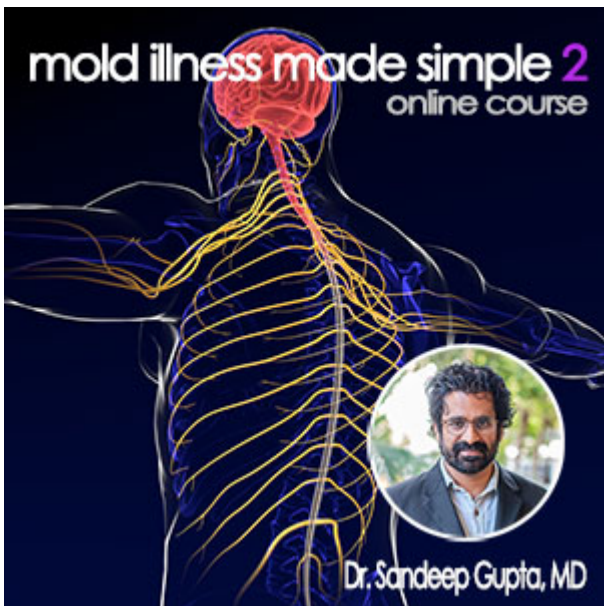


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