Unlock Lyme Disease Detection With T-Cell Testing Transcript

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Introduction to T-Cell Testing for Lyme

Welcome to another episode of the Healing Lyme Summit. I'm your host, Dr. Myriah Hinchey. And today we're going to be talking about testing T-Cell Activity to detect whether we have an active Lyme infection or not.

And here with us is Felix Scholz, PhD., Dr. Scholz is the CEO of Infectolab Americas. And, Dr. Scholz, please tell our listeners a little bit more about yourself and how and why you got into the field of laboratory testing.

Hi. Thank you for having me here. It's an honor and. Yeah. So I started out as a basic scientist. I studied biology and then did a PhD. Uh, the thesis was about skin immunology, and I did a few years post-doc research in the same field at Mayo Clinic and at the Center for Immunology here at the University of Minnesota.

And then I switched into the lab world by working for the Biotech company where I developed lab tests, basically from scratch, different types of lab tests.

And then I met Dr. Carsten Nicolaus, the founder of Infectolab, at a scientific meeting, and we started collaborating. And then I got the opportunity to to build, Infectolab for him. And so, yeah, And then here we are.

Right. So let's start by talking just very, very basics. So tell our listeners the difference between an indirect and a direct laboratory test for Lyme disease.

Yeah. So there's different ways we can approach checking for infectious diseases. There's very common platforms that are used by a lot of lab tests and different lab companies and different labs.

The most common one for infectious diseases is the so-called ELISA.

Felix Scholzu2019s Background and Path to Lab Testing

It is serology test where you need a blood draw and in the serum the lab to look for specific antibodies found in a patient binds to to a plate. And then you can quantify how many antibodies are per microliter of blood found.

That is the very standard method and is employed virtually. I think most labs do that. It's also an indirect test because the definition of indirect is here the that you check for an immune response against the disease.

And here you check for the BISA response with an antibody and then you detect antigens. If they pull out the antibodies and hence if you find the antibodies, the deduction is that highly likely.

The patient had exposure, both exposure against that antigen and the proper immune response and has found and built IgG the direct method would be like a PCR like where you check in a tissue or blood, depending on what pathogen you look for and checked with a PCR where specific primers are called are start ends for a biochemical reaction, amplify genomic material of the pathogen.

And because once you see that product in a PCR, you know the pathogen has been there, it's direct and that's what the. Direct is looking for. Fragments of genetic material in the organism, whereas the indirect is looking at the immune system's response to the presence of the organism.

Yes, exactly. That's correct. And another direct method would be like histology, like let's say you have a skin infection, you take the punch biopsy embedded, cut it and make thin slices and then stain directly for the pathogen.

That would be all to direct and another indirect way is T-Cells responses. T-Cells are like B-cells that part of the adaptive immune system. And ideally, in any infection, you get responses of these branches of adaptive immunity,

regardless of the disease.

Indirect vs Direct Lyme Testing

T-Cell also required for proper B-cell response. And you can check for T-Cells that are so called ELISPOT. That is when you draw the blood of the patient.

And in the laboratory they isolate the white blood cells, the so-called pbmcs and they put them on a little plate like a similar like in ELISA plate. But in this case there's a membrane and then the T-Cell get plated on there and then they get stimulated with specific antigens, similar like an ELISA where the antigens are plated on a plate.

Here the T-Cell get stimulated with it and it's still living T-Cell. And so once they recognize the antigen, they produce cytokines as they affect the function and they leave the cytokines like little spots on the membrane, and then that can be stained and quantified.

So basically in the T-Cell test, like an ELISPOT, you can quantify how many antigen specific T-Cells against that antigen that you tested for in the presence.

So basically that's called the T-Cell frequency. And the advantage of this type of testing is from that you can deduct a little bit how bad the disease is, right?

So one so T-Cell frequency is a little bit tricky, but one parameter that drives T-Cell frequency is the antigenic burden or how much pathogen is bearing the patient right now.

So if there's more pathogen in a patient with that antigen, you'll find more antigen specific T-Cells. So this also lends itself for like a monitoring test, so you can check in during treatment and see if the T-Cell frequency or the amount of antigen specific T-Cells found goes down over time.

And hopefully at the end of the treatment, they're gone because that mean there's no antigen in the patient left, hence there's no infectious agent or bacterium virus or whatever the disease was left in the patient.

So like with an IgG response, even after the infection has resolved, you could still have low IgG response to the various proteins and antigens, which, you know, could just be memory cells and immune surveillance, or it could still be an active infection.

So with the T-Cell test, you're saying that if the antigen is gone out of the body, there shouldn't be any T-Cell response to that specific antigen? In my understanding, not correctly.

Yes, that's correct. And the reason being so the way at least we hear it in Infectolab run the T-Cell tests, we see only Th1 T-Cell. So we do not see memory T-Cell so.

And that's why we cannot look into the past and the T-Cell lives. The estimates are rough because most of these studies come from mice, so you're not necessarily extrapolated.

But what we usually see depending on the disease and the antigen, the lifespan of this Th1 T-Cell is 6 to 8 weeks. So that means if you check somebody positive and then treated successfully three months post successful treatment, you shouldn't see any T-Cells anymore.

And with the antibody titers that is a little bit tricky. And that also depends on the antigen and the disease, so forth for B cells and antibody titers. The the important biochemical reaction if you saw with is doing a presentation to the B cell in the lymph node.

That is when the B cell makes the first scrambled antibody and checks in with a so-called Follicular helper cell. That's a T-Cell that has the antigen and that can measure how good the affinity is of the antibody to the antigen and give it back to the B cell and the B cell rearranged the genomics for the antibody again and do that multiple

rounds.

So that way you get a higher antibody, meaning an antibody that binds better and hopefully at the end of the day is the neutralizing antibody against that antigen.

And so this interaction is crucial to form basically at the end of the day, B cell that becomes a plasma, B cell and plasma B cells are the manufacturers of antibodies that measure the blood and so now there are certain diseases or antigens that favor that response and certain diseases and antigens that slow that response down.

So those diseases, like if you have some inefficient affinity maturation, what that process is called, you can have some of those diseases, a fairly quick drop in antibody titer once the disease is gone and others, you may have high antibody titers months or years to come.

Right? So like that, that what happens with certain diseases where we have good plasma cells do says people have years of protection from the IgG and then other diseases advantages fairly quick like in COVID for example, COVID is supported run from disease.

So you get mostly T cells of the th1 phenotype. The T features are neglected. Hence we see that people who have experienced COVID depending also on the age of the person.

The antibody titers drop fairly quickly, but the reason is because of the physiology of the disease. So you have certain diseases where you can do that and employ antibody titers for checking for successful treatment and other diseases is pointless because the antibody titers stay high.

How T-Cell ELISPOT Testing Works

And that's the advantage of T cells because regardless of disease, if you measure th1t cells after the buck is gone, the T cells would be gone within a couple of months.

Okay. So when you talk about it being specific to the antigen on how is that so like how, how do you not know that maybe you got some other sort of infection or that the T cells are responding to something else in the body as time goes on?

Okay. So in an antigen specific T so test usually what people use is very specific antigens. Most of the time a peptide. So antigens are usually proteins or chunks of protein like digested protein, right?

So an antigen is usually in the length of 10 to 12 amino acids long and it must to to be an antigen two criteria. One, it needs to sit in MHC class. Two, that is the the presenter molecule and the other one that needs to have fitting t cell receptor that is the receiving end on the T cell.

And so now if this requires a there that's like 10 to 12 amino acids. So and it makes it specific on the T cell that there's a certain amount of wiggle room in, in the T cell, what it recognizes of these sort because you can envision it's very short.

It's like 10 to 12 amino acids. An average protein has 800 amino acids. Right. So usually you find multiple of these antigen, some amino acid. But if you know from a perspective you see and that is often done in validation, you see that the antigens that hit a high population because not everybody has the same T cell except for the same a little of MSI cluster.

So that's different from person to person B And so the idea antigen hits 100% of infected people and you need to check that as a lab. You need to see if your antigen is that efficient or not.

And that that is not, not, not very simple. That's often usually takes takes time. So that's why often but also good lab tests take time. So it's, you know, new disease pops up and everybody thinks that it's a threat.

But if look specifically like for like the tests or t cell tests, even if it takes time until you have a good product on the market, it's like if somebody gets within half a year with a T cell test out comes out, that's usually not a good sign.

So so usually it takes time like this, for example, to work on the common antigen since like a couple of years now. And because it's a rare disease so we don't get so so it just takes time because you need you don't you want one needs to hit a big population of the infected but so through your two sports negatives and second yeah it shouldn't be cross-reactive right.

And with subspecies that's tricky sometimes because it's related diseases, share related antigens, obviously you cannot distinguish them, but so that's in certain cases that doesn't matter because of the treatment is the same.

But if treatment is not the same, it it matters if you have an overlap between closely related diseases, but that is also hard to figure out, like for a lab.

So there's no guarantee. So what we do is we run our antigens on non negative people to check that we do not have that issue right, because if you have a cross-reactive disease and you know these people do not have this disease, but you have a cross-reactive antigen, you will find a certain percentage of these people positive.

So that's one way we try to ensure that we don't have that issue because it theoretically it's possible. But so for this information to be clinically applicable, like could you just do this test in the end when you suspect that your patients Lyme is now in remission, or is this something where you need kind of like a baseline or you need to see what that initial response was or like you needed to see their t cell activity when they were symptomatic and and you know, had a large infection.

And you're comparing that to the end result. Or you could just do this test sort of like once in the end to confirm as best you can with any test that the infection is in remission or gone.

Yeah. So I think we see it that the doctors employ it either way, like an orphan from a some of our customers for example, they run with Crest do, do do do antibodies and then during treatment they check in with the T cells.

So they employ it like that. I think it's always nice to have a positive to begin with because then you know where you come from specifically with Lyme, where we see tools usually low t cell frequencies.

So that means like for example, let's take Epstein-Barr, the Epstein-Barr with the with the tissue test, no question asked. Like because Epstein-Barr, if somebody has a reactivation of so many viral particles you find through the roof antigen specific T cells, no question asked.

So but now you have more tricky diseases like Lyme where the buck is not necessarily always seen by the immune system. And then you can run into issues with the indirect detection method, because if the immune system doesn't see it, doesn't see it.

So that's additional access you get.

Interpreting T-Cell Frequency and Treatment Monitoring

Like for example, if you are very good at diagnosing Lyme based on symptoms and you run antibodies and T cells and that that can be additional helpful information because now if you know for sure this patient has Lyme, but the T cells are negative, then you know, the T cells are fighting right then, you know, okay, I need to help them to to to get fighting or.

Yeah, it's always I personally think it's always good to have a starting point to compare it to after treatment, because then you also know where you come from.

A different person have ten antigen specific T cells per percent or five and like do you need to be more careful? Like if you have a slow, like a low t cell frequency to begin with, why do you need to worry about if it's negative for

other?

And so I think it's always good to have those data. But I think also people should keep in mind what they spend on lab tests with their patients because it's depression.

It's like you can spend so many things under the sun or on lab tests. So I always appreciate if the doctor thinks about what is really useful in this situation.

And it doesn't make sense. Right? Right. And that's what I was thinking when I was asking that question because so many of my patients already come in, you know, and they've spent thousands of dollars on testing.

We already know what they have. And so it's like, okay, you know, do you think it's important to get a reading on the T cells at that point, or is it okay to use this almost as a check to make sure that it's cleared?

But I think you just answered that. So yeah. So I mean, the the check in that it's cleared is always a good point, right? Because then, you know, because if disease what we talked about earlier is there still some antigen left you will you will find 56.

Right. And so if you don't find an ELISPOT any T cells, then you can be fairly certain it's cleared. It's not 100% either. Right. But at least looks good.

And I was I was that was my next question. So like, what is the false negative rate? Would this type of testing? So that is a very tricky question because clearly if you look at the sensitivity, specificity, specificity that the labs always tell about line testing, that is not a real word measure, because often specifically for serology, there's like cohorts you get for chronic and acute Lyme from the CDC or age or from some Lyme nonprofits, you can get access to those and the they're very helpful and they record these cohorts.

But the issue is they're designed for lab test development. What I talked earlier, it's really hard to find good antigens. And now if you get access to like, let's say, 100 samples from the CDC that are known Lyme patients, known positives, right?

That's a super good start because then you can check out your antigen and, you know, if you perform worse, then you don't care. That antigen is not a good choice. So it's really helpful.

But so now what what what people can do because it's hard to get good cohorts as a lab. They utilize these to calculate also their specificity and sensitivity, which obviously is then pointless because that's not a real road measure.

But so clearly it's not not 100% of Lyme patients have IgG, you can slot it. The real world immune response to Lyme is way worse, so you'll find probably more around 40%, 45%.

So and that is more realistic and similar is true for T-cells by that. The thing is, yes, the immune system doesn't see the buck, The mouse system doesn't see the buck.

So so any indirect test will have false negatives in life that that, in my opinion, also will never go away. But because it's the buck said somewhere in the tissue like direct, it's a pointless because you don't find the DNA in the blood indirect.

If they just sit quietly in the tissue, indirect tests would be negative to like. And that's what we see. But like on both ends and we have some customers that work around with that and they do when they suspect line and don't see any positives and they start treating and then they check in with T cells and two weeks later they usually, if it truly was Lyme, they see that he said two weeks later because what it does is what the immune system needs.

It's like jumpstarting the immune system, right? You start killing the bug, the dead material ends up in the lymph node, there's the protein, the T cells can be primed, they can divide and go fight.

And so contacts with blood where you catch them in the blood. All right. So that is the issue there. And yet that is also false positive rate.

Antigen Specificity, Cross-Reactivity, and Test Limitations

Sorry, excuse me, false negative rate. It's just really, really hard to actually do proper cohorts on that because you would need to study where people know 100% this hundred people have lied right now and that type of quote is really hard to get because people are not sure if somebody is lying or not. Right.

So so on. Why don't you tell our listeners how they can find more information about t cell testing? Yeah, so we have on a webpage in fact a lab minus Americas dot com some useful information where we go a little bit into the science of t shirts and t cell detection.

People can go to that web page and read on that. And if a doctors are curious about this, they also can reach out to us and we can answer questions. If there are any questions.

Yeah. And if you're a patient listening who's interested too, you can talk to your doctor about learning more about, in fact, our labs and t cell activity testing.

So for those of you who are subscribers to the summit, thank you. Stay with us. We're going to dive deeper into this topic. And for those of you who aren't click that button below so you can come with us and listen to the rest of this wonderful interview.

So I want to ask regarding all of the different species of Borrelia that cause Lyme disease and Tick-Borne relapsing fever, how does a t cell activity test account for all of those?

I'm way more familiar with, you know, doing immuno blots and things like that where you're looking at this specific antigen protein chains and the antibody response and you know, they're looking at all of these various species when it comes to looking at t cell activity on what species of Borrelia are covered.

Yeah, So, so yeah, that goes back to the beginning. That is the tricky part of antigenic design. Like what what is a good antigen and for T serves B has another roadblock that you usually do not have in serology.

So in western blot immunoblot and Eliza is that we cannot use so-called recombinant antigens. So that is a technical term. And so in the leopard, usually if you are curious about a protein or you think it's an antigen, you can manufacture that in an in a bacterium, in big quantity, and then you can utilize it and put it on plates and or on the, on a gel and then transfer on the blot and then go from there.

That's very simple and very straightforward. The issue we have is that for T cells, these recombinant proteins for whatever reason, cause false positivity.

So they will come back to a cross-reactivity of T cells. And so that's why we cannot use them. And that is another slowdown, because we need to really know right now out of like these 800 amino acids, which one are the ones for T cells that we can utilize and then we cannot make them recombinant.

We need to actually manufacture them in a different way or we need to purify them out of the pathogen itself. So it's a little bit more tricky. And so that's why we don't have that arsenal of all antigens available for T So testing.

Uh, so currently we can do we have two different sets of antigens like for Lyme. And the reason for that is being that blindness, what I mentioned earlier is tricky for the immune system to see.

So if you broaden the how do you say the wet chip And so we have to for those and they detect in their specific antigens four different subspecies in there.

So it's not only the B 31 mix. We have also was P mix where we really can detect a different European species that

start to be seen. You know, small pockets in the US as well.

So you don't have to worry about that. And for Tick-Borne relapsing fever, we have only my omotayo as an antigen, so not for the other relapsing fever species.

We do not have antigens there yet. So if somebody had one of those other species, obviously this test would not be accurate for them because it's not looking at the specific antigen that they're infected with.

Yeah, that's correct. Unless there's some cross-reactivity because of relationship. But also that is pure speculation because again, it's not like one antigens of Borrelia species.

There's not a lot of research done. So there's also Hartz two to get good information. What is the cross-reactivity of or of a Lyme causing Borrelia species where there's a on relapsing fever, Borrelia species, right?

I mean the related, but that's like nobody knows like what the re antigens or she had.

Using T-Cell Testing Clinically for Lyme

So, so we cannot know that part. So it sounds like it all boils down to the immune system, right. Most of these tests that are being utilized, whether they are IgG, IgG, or T cell activity, these are all reliant on a robust response or at least a appropriate response from the immune system.

So what other tests can we do to evaluate a patient's immune system? So we have an idea of if it's actually responding correctly. Yeah. So there's actually a test we just developed a couple of months ago or last year, but published a couple of months ago where we actually assess the functionality of the immune system in a patient right now, like at the time of the blood draw.

So what we do there is we check in on CD8 and CD4 T cells that have seen their antigen. So meaning we we check for like all of them and we can actually quantify how many of these antigen experience T cells, regardless of the specificity.

Felicity that's the important distinguishing. You are currently in fighting mode. And we quantified that in two ways. And one way is percentage of responders, like we stimulate the cells, we give them a few hours to do their thing and then we, we the quantify how many have responded to the stimuli.

And we usually see people who do not have an infection currently respond to with 5% activity or 5% of T cells C positive and around 10% to 13% of the active in these people.

And then we also quantify the amount of sector cytokines made per set on average, and that is very unique measure because that actually gives you some how effective is the tissue right now?

Like does it is it on the low end of the sexual function on the high end or exactly where you want it to be? So there we see of differences between infected and not infected like the Austin see in the city force and the CDC.

It's roughly so we have an arbitrary unit for this. We call it immune activity index. And we see usually five K units in healthy people. But if they're fighting an infection that jumps up to ten K units or 15 K and viral infection, we even seen something close to 20 K, So there's a significant more amount of effect of cytokines seen in T cells that are coming from a patient who is currently fighting infection.

So that is a nice addition to, to, to see if you test the patient negative for everything. And you know, you look at the immune system when York is the moon system think thinking right now I need to fight or I'm good and if you see it's upregulated in fighting then then you know you need to search for that.

So so what's actually going on with the patient? Yeah. So to be clear, this is a general assessment of if the patient is fighting an infection, not specifically like a Lyme or Borrelia infection.

Right. It's like actually a test that you can quantify the immune response. And you would also see if somebody is like immune impaired, like, for example, this.

So this similar test like this was used to assess how, for example, prednisone works, right? So so and if you look at those old publications and you can tell the people on prednisone, for example, produce way less cytokine amount per t set, right.

So you would also see that like in a scenario like that, you would expect that if somebody has an infection but the immune system is not really up for it, then you would expect the percentage of active T cells to be higher than in a in a non-infected person, but you would expect the effector cytokine unit to be lower than other infected people because that makes sense.

Because then that that would be the definition of like immune impaired. Somebody who was immune response is not mounted appropriately. Right. And that you can that's actually what this test is designed for to see.

So what other things can you look at what other infections viral bacterial parasitic what else does in fact a lab test for using this t cell analysis.

So for the antigen specific stuff we have, I think I always don't know 100% 17 antigens, mixes validated. So that is from the tick borne complex we have select for Borrelia, Burgdorferi and Seliger any right.

The mixes that we have. Yeah, the bartonella, but PCR rickettsia one or two. So we have some. Give me a second. Take your time.

Immune Function Testing Beyond Lyme

And then we have some super infections like chlamydia, pneumonia and mycoplasma pneumonia that people tend to pick up with chronic disease. The and then we have a whole slew of viruses like COVID, which is interesting for long haul product because that's actually the only test where you can check if there's still a viral reservoir in a patient because there's like a third of long haul patients that may have still some COVID.

The bacteria viruses like the last of two virus left and it's published that that is highly likely in the lung, inappropriate in the gut. But as a doctor, you don't have means usually to test their right.

So but the T cells are there. Like if you have a reservoir of viral reservoir, you'll find the T cells. So that's actually one of the only test you can employ For that to check if you have a longer patient is a virus to present, yes or no.

And then we have Epstein-Barr virus so we can check for lytic latent actually distinguish the two scenarios because of specific antigens we have for each of those scenarios.

HSV one, HSV two. Human Herpesvirus six What's important and long COVID 19 and zoster. So we have quite a few in the viral compartment. And in the viral compartment they're all really good immune inducers.

So like of the question will be at earlier with Lyme of the false negatives, it's like virtually not there like because usually if somebody really has these viruses, there's enough antigen around and the t cell numbers that we find are usually fairly high.

That's very helpful. I see a lot of these viruses, you know, at least from an antibody perspective, we see a lot of really high antibodies to all of these viruses that you're talking about when we actually look for them.

And I'm kind of, you know, explain it to patients as these are all sort of like straws on the camel's back of the immune system. And so the more infections you have, the more synergistically they're going to work together to cause immune dysregulation and inflammation, and then the easier time all of these infections have kind of living inside of us and breaking down our bodies and feeding off of us.

So. Yeah. Fascinating. And the beauty of the tea sets in this context is that you actually know which of these are an issue currently, right? Because again we look for antigen specific T sets in that context and we can tell if that is the current issue or not because these viruses are good immune inducers.

So that means you will find long lost plasma cells and hence IgG for a time to come. So that means if you find like the early antigens for EBV skyrocketing high that can come from a reactivation right now or from one that was six months ago and the T sets would actually fill in the gap and actually tell you is it right now or is it not?

So and I imagine that you have full panels that one can do to evaluate all of those at once. Yes. We have a school of preschool that for us, a lot of our customers are ordering those specifically also like some cancer clinics, because, you know, some of these are so the the viruses, most of them that you check for belong to the purpose complex.

And like we've seen the and they're some of them are associated and more literature comes out the choice but that the other ones like EBV were not suspected to be associated with cancers but now new research shows that they actually are so it's a good test also for people that deal with cancer clinics to check on those.

What's the status of these viruses there? And yep, so that's a what we do. Right. So is there anything else that you would like to share with our listeners?

I don't know. I think I'm. Good at making sense of advice when it comes to testing for any of these complex chronic illnesses. Yes, actually, I think ask your doctor questions and why they ask want to order certain things because I believe that there's a lot of lab tests out there and not everything is not it?

It really depends on what a doctor wants to see. But I think it also needs to be a doctor needs to be able to explain and justify what lab tests is order because it can or anything under the sun and I'm a big fan of ordering cater to a specific situation like and then also think about what lab test is appropriate, like direct, indirect, like a lot of PCR tests are not that expensive, but it doesn't make sense in all scenarios.

Like if the buck is not in the blood, you can skip that. You don't need to do it. And so, so yeah, obviously if it's justified symptoms, what could be possibly going on and then picking specific tests that have the highest chance that's giving good answers like I think a good utilization of of how to approach it.

T-Cell Panels for Other Infections and Viruses

That's usually what I try to tell people that they think a minute about what what really needs to be solved right now with the lab tests. And also as a doctor, the more specific you ask the question, the more specific your answer would be.

Right? I mean, there's lab tests wherever you can, I don't know, deep sequence, the whole genome of pathogens. But does really answer the question, right?

Because often you can only test or you can only get answers to what you're actually ordering. And I think a lot of people don't realize that I have so many patients come to.

They're like, Oh, I saw my doctor. I'm negative for everything. I'm like, everything. What's everything? I mean, there's, you know, 5000 different tests that could have been ordered on you.

And it's like, you know, they basically had like a CBC and a stamp and, you know, they think they're good to go and they have a clean bill of health. And it's just you know, it's crazy that a lot of people are walking around thinking, does, you know, when it's like you literally can only get answers to what you asked for.

Right. And I'm again, I think, yeah, it's like the approach. I think something is wrong in order this laundry list of lab tests I just like I don't know, it's like blindfold throwing the dart.

I think that's pointless if you aim for one specific test, you may have a better answer then, because also, if you then run some certain tests that are like also uncertain, but then you suddenly get distracted and go down a rabbit hole to something completely irrelevant, like certain lab tests give you suddenly answers that you didn't look for.

But they may not be really relevant to get the patient better. So so I think always like thinking about what's really necessary and relevant and what is my question and the clearer the question is ask, the clearer the answer would be.

Right. And I think it comes back to just the basics of, you know, learning how to be a clinician, right? Like we make a differential diagnosis for a reason. Right?

And then we have to go through and rule those certain things out or rule certain things in. And when it comes to Lyme and tick borne diseases, I mean, it really is a clinical diagnosis, right?

So it's like we've already most of us have come to the clinical conclusion that this is what is going on. And then we're trying to use laboratory findings to confirm that, right.

Or to help support that diagnosis. And it's funny because the CDC, on its website, when it talks about Lyme disease, even talks about, you know, Lyme being diagnosed based off of three things, like, number one, clinical findings and symptoms.

Number two, could you benefit, you know, exposed to this infection? And then number three, it says that laboratory results are help fall in confirming the presence if you're using validated methods.

So, you know, not that I put all of my faith in the CDC, but it's like, you know, they're even saying this. Yeah, a lot of clinicians are just looking to, you know, even through a conventional lab, which is just dismal, you know, the word positive or negative.

And that's what they're going from. And it is like maddening to me because I have so many patients that come in and they're like, Yeah, I've been tested for Lyme like 20 times.

I definitely don't have it. You know, I've been to 16 other doctors. No one can figure out what's wrong with me, but every single one of them has told me it is definitely not Lyme disease, you know?

Yeah, it's it's complicated. And I mean specifically in Lyme. And I guess that's also where the CDC probably mentioned that, right? If you only find in around 42 to 50% people antibodies, then it has to be a clinical diagnosis.

But because then flipping a coin has a higher chance of 5050. Right. So and that's why I think makes complete sense to to their get good training on on what are symptoms that that match the picture of Lyme and so so what what some some people do is they what what I mentioned earlier pretreat and then two weeks later check because then you can use at least as somewhat confirmatory because if you start killing the button and actually was there, you see an immune response one way or the other, right?

So that that is also a choice. So you see a stronger T-cell activity when you've pretreated for two weeks as opposed to just doing the test right off the bat. Yes.

But so is it kind of like shrinking the infectious load takes a little bit of like the stress off the immune system, not it's able to respond or. No, no. No, you're killing the bug.

Yeah and so so it's now Lyme sits let's say, somewhere in interstitial tissue. Right. So there's no immune. It's oh so it's like it's the reaction to the LP.

Suddenly suddenly you make antigen through killing the antigen available in the lymph node and then as an outcome you it's on T-Cells and the antibodies like and we see that that pre treatment method is fairly successful like we have here in our neighborhood.

The doctor that that uses us since day one and when I look through data one day I realized that he from one month to the other, had a higher positivity rate.

And I was like, so I gave him a call and said, Hey, what happened? Yeah, it said he switched to a trigger treatment, like basically jumpstarting the immune system.

Clinical Judgment, Insurance, and Closing Remarks

So and so that seems to help getting more detection and makes sense. So in a way it's kind of like using a provoking agent if you're going to do like a heavy metal test or like using Glutathione for several days leading up to doing like a mycotoxin. Correct.

It's the same thing, but it's just different method because it's a different roughly like you need to help the immune system see the antigen. That's all you need to do. And we also see that in people who test positive in the first round and if they doctor re checks within a few weeks, the T-Cell numbers actually go up because of the same reason you kill the bug with your treatment and then the immune system sees more antigen, makes more T-Cells, and then the T-Cell will go up.

It makes sense. And then a after successful treatment, it goes down slowly down again. And until if it's cleared, it's cleared and then the T-Cells are gone.

But you see that too. So sometimes when people start treating, then they call and say, Hey, I just confused. It looks like the disease got worse, but the patient feels better.

But then you say, No, actually you just killed a lot of POC and that made system see more antigen. And because more antigen, more T-cells, that's why temporarily the T-Cells go up.

That means is exactly happening. What you intend to do, you're killing the bug. Right. Right. So that's that's another where you can use T-Cells for if treatment works.

But obviously it's not really a requirement because it's also good to see after clearance that just gone you don't need to check like every two weeks.

That's all. It's a waste of time, right? I know. I wish these tests were covered because you would get so much more, I think peace of mind from patients.

I mean you know luckily them seeing the severity and the frequency and the sheer number of symptoms coming over time, you know, shows obviously that what you're doing is working, working.

But with Herxing in the mix, you know what I mean? And also that's really taking time because, you know, in my opinion, it's not just about killing the infection.

It's about healing the body and fixing the immune dysregulation being caused by the infection. It just it takes a long time. So, you know, it would be great to be able to do a test like this every few months, you know, to have that feedback.

So what would we do usually is we we have an or form a field for diagnostic codes so the doctors can put appropriate diagnostic codes and there and we itemize the bill usually.

So each antigen gets its own line with their own CPT code and the CPT code for our way of testing, it's $135. So so there's a chance of patients getting money back if they sell themselves to insurance.

I'm not an insurance person, so I don't know how good are the chances, but people can try. Yeah, they can try and they can also call of time and see if it'll be covered, if they have the appropriate ICD 10 codes and the CPT codes.

Yeah. So. So they can check in with insurance before. Yeah. That's, that's also good. That's a great point. Yeah. So I want to thank you so much. Go ahead.

I think some do get reimbursements. I mean, obviously that's between them and the insurance. But I had a call last year from a a patient that just wanted to get get our bill resubmitted to her.

And she said the year before she got the money back from her insurance. But she also disclosed she has experience with insurance billing. So I don't know if there's a trick right.

There's always a trick when it comes to insurance companies. That's not my forte. So. Well, thank you, Dr. Scholz for joining me. And thank you to all of you at home for joining us and listening.

I hope that you found this information helpful today and you learned something. I know. I certainly do. Every time I talk to this man. So I hope that what we have shared with you today helps you on your journey to Healing Lyme.

Take care. We'll see you next time. Thank you very much for having me.