How to address tick-borne diseases and fatigue

Guest: Dr. Carsten Nicolaus

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Kirsty Cullen - [00:00:16]

Welcome to the Fatigue Super Conference, I'm Kirsty Cullen, CEO at the Optimum Health Clinic, and today it is my pleasure to introduce Dr. Carsten Nicolaus.

Dr. Carsten is a world renowned Lyme expert, having dedicated his career to the research, diagnosis and treatment of Lyme disease and other tick-borne diseases. Since 1990, he has treated over 27,000 Lyme patients from over 50 countries. In 2006, Dr. Nicolaus founded the BCA Clinic, Lab Research Facility and Training Academy, establishing successful diagnostic tools and treatment protocols. From there, in 2016, he founded and became CEO of Infectolab Americas with the aim of developing rigorous and high quality testing procedures for virus and bacteria.

Dr. Nicolaus has become an active member of the International Lyme and Associated Diseases Society and the Associated Education Foundation. He is a certified training physician who has taught over a thousand doctors.

Dr. Nicolaus, welcome.

Dr. Carsten Nicolaus

Thank you for inviting me. I'm excited, hopefully to answer many, many of your questions today and to give the listeners a better insight about tick-borne diseases. So, specifically Lyme, it's co-infection and the compromising health conditions as well.

Kirsty Cullen

Wonderful.

So to begin with, I think many people are familiar with Borrelia bacteria when we think of tick-borne diseases, but I thought it would be useful to talk about some of the other key co-infections that certainly we see clinically, but also that you've tested for in the context of your work over many years, because I feel perhaps, these are potentially less well recognized and understood in the context of ME/CFS. So, Dr. Nicolaus firstly, why are co-infections so important to identify?

Dr. Carsten Nicolaus

This is a very good question, and I'm happy that I have the opportunity to answer this one. It's definitely, since a long time, not anymore, justified to use everything on Lyme, as we have learned a long time ago, that there was always something else. When I stepped into the field at the beginning of the 90s I didn't have any background knowledge about the co-infections, so I was only focused on Lyme, but always noticing that not even 50 percent of my patients responded properly in treatment.

And it was more incidentally, that I noticed a huge impact of co-infection and that was not the typical tick-borne ones, like I want to explain a bit later, like Bartonella, Babesia, Ehrlichia and others. So I

stepped in that field of co-infection first, gathering more information about chlamydia pneumoniae.

So at the beginning of the 90s, we have noted that there had been a lot of patients in Germany having cardiac issues. And these patients had at the same time mostly a reactivation of chlamydia pneumoniae infection, which is now seen as one of the opportunistic bacterial infection, also in the sense of a co-infection very present in Lyme patients.

So, by the way, we have published that 85 percent of all Lyme patients in chronic stagers have reactivation of chlamydia pneumoniae at the same time. And when I focus on these patients with cardiac issues, there was a general recommendation to put these patients, for three months, on either tetracycline or macrolides, so the similar treatment which was recommended for Lyme, beside the doxycycline.

I went on this alternative solution to make treatment with clarithromycin and erythromycin in those days, which was not an appropriate and well recommended treatment for Lyme. I noticed that these patients, specifically the ones who had Borreliosis or Lyme disease at the same time, had been much better responded on the treatment as I was used to seeing for the typical other approaches, and that was my first contact with a co-infection.

Later on, I've learned that there are many different, the real ones are the ones I have suggested with big problems all over Europe and specifically in the U.K. With some of them there are a lot of reports, case reports and some studies that Ehrlichia is playing a role here in the U.K. Bartonella is getting more and more prevalent and Babesia as well. And today it's definitely appropriate to look for these co-infections, because that is the reason why the complexity of these chronic illnesses are becoming more, bigger and bigger over the time. And this is becoming a real problem.

Kirsty Cullen - [00:05:28]

So let's talk about a few of them specifically in terms of symptoms, transmission and testing. And you mentioned there, chlamydia pneumoniae, what is it? What are the symptoms like? And, of course, it's very important to make a distinction between the subgroups, isn't it?

Dr. Carsten Nicolaus

Yeah. And so at the beginning, it's important really to differentiate between the real co-infection. These are the ones which are transmitted by a vector, like a tick, like other bloodsuckers, could be a normal mosquito, could be a horsefly or, fleas are also seen as some of these vectors. And we have a second group would be more called opportunistic germs or bacterial or viral infection. So this is also quite common in patients to see airborne transmitted infection like chlamydia pneumoniae, like mycoplasma pneumoniae and all the typical viral infections like Epstein-Barr virus, EBV, coxsackie, cytomegalovirus who are playing a major role in patients with these chronic tick-borne diseases at all.

And it's so important to have the right background knowledge about the symptoms and complaints. It's not only based on diagnostic tools. This is definitely something which I want, a message I want to transmit, you know. Mostly doctors are going for some diagnostic and looking for the typical link. It's much better for us to listen carefully to your patient to get an overview of what was going on in their medical history, what type of symptoms and complaints they have presented in the past and currently. If you listen carefully, you will get the first big hint of what it could be.

And we have really to consider that some of these co-infections, including Lyme, are basically seen as clinical diagnosis. And if you are lucky, you can confirm that later on by doing blood tests, but not always. And this is the tricky part and which is always leading also to some failures. So patients will be ignored while showing up with zero negative results, but presenting the typical symptoms but the doctors believing is most often, without evidence and doing some serology there's nothing, it's just in your mind, and this is one of the issues.

And so, coming to more details of these co-infections, in general, we have a lot of overlapping symptoms. So if someone is presenting, for example, joint pain or joint ailments or joint swelling of different joints, it is not always Lyme, it could be something different. So we have the big group of reactive arthritis, for example, that's now also mostly bacterial or sometimes the viral infection who can cause these joint ailments at the same time.

And it's similar with other symptoms and complaints, many of them, again, are overlapping and you have no chance to differentiate immediately the certain infection. But many of them have also very unique and a symptom of complaints which are immediately giving you the right diagnosis. And this knowledge and this expertise is so important for a physician. If you can rely on that background knowledge, then it's much easier to handle patients and even to point out which diagnostic is appropriate. And, so without that knowledge, I would say you are lost.

Kirsty Cullen - [00:09:36]

I think a really good working example of that is that with chlamydia pneumoniae some of the symptoms are very similar to a Borrelia infection. So we're looking at fatigue and fever and sore throat and headache, maybe some sinus related symptoms as well. There's always that confusion isn't there, potentially.

Dr. Carsten Nicolaus

Yeah, and even chlamydia pneumoniae has this typical overlapping symptoms of joint and muscle ailments, which are quite similar to Lyme, but they have also unique symptoms and this is more or less sinusitis like symptoms. So these patients have very often pain in the frontal face area over the sinuses. They have typically ear pain, pressure in the ears, they have the typical coughing, not similar to the coughing which you have suffering from chronic bronchitis or asthma or something like that. Not only is sometimes some single coughs in the morning while getting up and specifically while preparing yourself for the bed time and during the day probably you will notice some feeling of having slime deep in your throat. And also very typical pathologies based on chlamydia are the onset of temporarily tachycardia and tachyarrhythmia.

So this is completely different to Lyme. While Borrelia is causing the opposite, a very low heartbeat. So less than 60, less than 50, less than 40, which is sometimes becoming very life threatening. Chlamydia pneumoniae and also mycoplasma pneumoniae causing the opposite. So, we had onset of very fast heartbeats due to any reason or without any reason. This is a very typical finding that chlamydia or mycoplasma that could be part of the mix infections.

Kirsty Cullen

And that just speaks to the importance of that clinical work, doesn't it, in terms of assessing the symptoms first hand before making decisions about the clinical direction that you want to take with regards to testing?

Dr. Carsten Nicolaus

Yeah, and I want to admit also the following, because that's so important. You know, there's some general knowledge that the prevalence of chlamydia in the population is quite high. And so on average, around about 70 percent of all citizens are presenting IgG antibodies and most of the labs are offering only one of their routine services IgM and IgG diagnostic. And you know, you can't rule out, in principle, many information of the IgG antibody testing that only indicates that there was a form of contact. Yeah, and it's not automatically a chronic infection.

And for that reason, it's so important to include another immunoglobulin, the IgA which is typically seen for reactivation of these infections. There are not many labs offering this as routine services. This was one of the reasons why I was so driven, setting up my own lab. I was always frustrated getting really only restricted access to a diagnostic. And so, if you screen the literature and are looking for good science, it was quite obvious that for routine testing we should include also IgA antibodies.

And this is the important part. If someone is positive for chlamydia, mycoplasma, also for the viruses presenting IgA bodies, then we have a safe sign that the chronic infection is still active. Yeah. And has to be treated. And this is nothing you can't rule out if a lab is only presenting IgM or IgG antibodies.

And even recently, we are still living in the pandemic and everyone is more or less involved into Corona, for prevention reason or you have been infected. And even further monitoring it looks like that, even for Corona, IgA is also playing a major role to get this information, specifically if you have a status after vaccination to read out how good your protection will be. Yeah.

Kirsty Cullen - [00:14:22]

Let's move the discussion on then. And let's talk a little bit about coxsackievirus, which is, of course an enterovirus. Can you explain a little bit more about that?

Dr. Carsten Nicolaus

Yeah. You know, in principle the viral infections are very tricky and challenging. And not so much regarding the diagnostics. So we can really rely on good diagnostic tools. But the treatment option, this is the tricky part.

So most of the viruses, which are quite common in patients with chronic tick-borne diseases are, as I mentioned, EBV, coxsackie, cytomegalovirus. And one of the major symptoms is always fatigue. Some of these viruses, and this is also more or less seen for coxsackie, coxsackie can also have a big impact on cardiac issues, unfortunately. But when it comes to the treatment, then we are lost.

So screening the literature, there is no official treatment approach where you can get the best eradication of coxsackie. So it's more or less a supportive treatment to enhance your immune capacity, hoping that later on the immune system will be able to keep the problem down or to eliminate the virus.

And for the other viral infections like EBV and cytomegalo and specifically the groups of the herpes viruses, we have really good antiviral treatments. But this is different for coxsackie. It's really a challenging viral infection.

Kirsty Cullen

So essentially, we need to identify where we need to eradicate and where we need to support the immune system.

Dr. Carsten Nicolaus

Exactly. So I would suggest that we have really good options for many of the herpes groups, a really good axis of very potential antivirals, oral ones, IV ones if it's becoming a more serious problem. There have been also some good trials regarding EBV and cytomegalo. So, there was a lot of research done in Stanford University and also in one of the biggest hospitals in Germany, the Charité, Professor Scheibenbogen focused on the issue of chronic fatigue, autoimmune diseases and specifically the influence of viral infections. And there have been several multicenter studies in the past showing that with some of the antivirals, you can definitely get a good outcome.

But on the other hand, it also came up that not all patients have responded properly on the treatment and there's definitely a higher risk of side effects. So specifically, the liver function could be affected. And so for some of the patients, the treatment has to be based on very serious side effects, unfortunately.

Kirsty Cullen

So now let's talk about Bartonella, which I know is always of interest to cat owners, and I know in your experience, Dr. Nicolaus, Bartonella is very common as a co-infection of Lyme disease.

Dr. Carsten Nicolaus - [00:17:52]

Yeah, definitely. So we can suggest that Bartonella is very common and is becoming more and more important, more often seen. There's a growth in the tick population of Bartonella year by year. And Bartonella, is for me, being now for more than 30 years in that field, the most trickiest co-infection than ever. Yeah.

So it will start really with the diagnostic, which is very challenging. So, you know, the access to serology is not giving us a very reliable type of testing. So, I have learned that you have, with the usual serology means IFT testing or ELISA testing when it's available. You have a maximum chance of 5 to 10 percent to detect Bartonella. Unfortunately, the overall majority is not detected by running these tests.

The reason is quite simple. Most of the time when Bartonella has entered the human organism, it is resident in the interest, in the red blood cells. And this is different to many of, there's only one co-infection, but this is a parasitic one, Babesia, which is doing the same. Most of the time these co-infectious diseases are resident in the red blood cells, which is a quiet, safe place for them to survive.

But on the other hand, that means that it's not seen in the bloodstream or in any other part. We have, so on average, once a month a chance when these bacteria want to grow up, that means to replicate, they have to leave that safe environment and then they're temporarily in the bloodstream. So that would be the best time, but you have no clue when that really is.

Otherwise, Bartonella is also very often seen in the lymphatic system. So if patients have chronic swollen lymph nodes, in different areas, so in the frontal neck area or under the axilla or in the groins, it is most often a chronic form of Bartonella infection.

And more recently there has been also introduced some new diagnostic tools to look more into the skin pathologies. Bartonella is presenting a lot more skin pathologies than Borrelia ever did. So for Borrelia we have an acute stage of the erythema migrans and chronic stage of the acrodermatitis, but nothing, nothing else. And this is different with Bartonella. We are aware of many, many different skin pathologies which can direct doctors on the right diagnosis. And that requires also some other diagnostic approaches.

So Bobak Mozayeni, a good friend of mine and one of the leading Bartonella experts worldwide, he is proposing to do more and more on skin biopsies. All of these typical rashes, the Bartonella rashes are quite common that are white or red lines, mostly on the back side of your body. So in the lower back or middle back area or lateral side of your hips and legs. And if you go for biopsies of these pathologies, you have a very good chance of doing direct testing via PCR on Bartonella.

This is not very common at the moment because it's a more expensive type of treatment and not available, let's see, for these general routine services. And you need a lot of expertise in the lab to run this type of testing precisely to get a good outcome of the diagnostic.

Kirsty Cullen

And I know Bartonella is something we test for quite regularly actually in clinic.

Dr. Carsten Nicolaus

I know. But as I mentioned, if you go on routine testing, most often it will fail and that means you'll get zero negative results back. And so, for most of the GP's then it's excluded. So if there's no sign in the testing, they're believing is, OK, it could be anything else, but not Bartonella. And this is the challenging part.

And this is what I mentioned at the beginning of today's interview. It's more important to see all the clinical facets of this illness. And Bartonella is very specific. We have four major impacts of Bartonella. So we have discussed so far, the skin pathologies, which you direct to the diagnosis. But Bartonella is

also doing a lot of trouble in the nervous system. It can, in principle, affect any part of your nervous system, the brain, the cranial nerves, the peripheral nervous system and also the autonomic nervous system.

And so, Lyme is doing really big issues regarding neuropathies, but it is even worse if Bartonella caves in that game. And so patients who have very serious forms of neuropathies, so I would definitely recommend always to check them on Bartonella. And also patients who have had several relapses in the past, so identified as Lyme patient, but getting constant relapses after a certain time. This is also quite common that these patients have probably, a major issue is Bartonella in the background.

Other organ systems, which are most often effected, are the GI tract. And this is also something which is very surprising and very interesting. Bartonella can easily imitate chronic gastritis or helicobacter pylori-positive gastritis, for example. And this patient will present all these symptoms but going for the specific examination, like gastroscopy, for example, the gastroenterologist will tell you there's nothing, it's just in your mind. But the symptoms, which are a day for day burden for the patient, are exactly the same as having a helicobacter pylori infection.

And it can also affect the deeper parts of the GI tract, causing diarrhea, constipation, abdominal cramps. And a very serious problem by the way, or dysarthria is also quite common. And so the reason for that is it is imitating GI problem, but it's more an neurological issue. So Bartonella is invading into the nervous system, causing local inflammation, which is giving the patient false information, and this is the issue.

Or Bartonella is a serious problem affecting your eyes even more than Borrelia. It can affect any part of the eyes causing only, let's say, some vision problems, can cause some floaters, but also sticking pain behind the eyes. And for Bartonella, we have a very specific syndrome called Parinaud Syndrome, this means it's a trois of three clinical findings. Inflammation of the eyelids, so these red conjunctiva at the same time, then inflammation of the local lymph nodes on the same side. And this is also very challenging.

So looking back, let's say 20 years, that was quite uncommon. So probably I've seen 2 to 5 cases a year. And while Bartonella onset it's more and more seen. So I have seen the ocular parinaud's syndrome caused by Bartonella, quite often, minimum once a week. And even in U.K. patients.

Kirsty Cullen - [00:27:05]

And am I right in thinking, Dr, Nicolaus, that Bartonella can exist in persister forms and is that linked to these periods of remission and what have you?

Dr. Carsten Nicolaus

This is a very important point. And more recently, in summer 2020, we got notice based on publication from the Johns Hopkins University that actually two of these tick-borne diseases are able to set up persister forms. Persister are defined as microcolonies, mostly embedded in connective tissue, producing their own slimly environment, which we call the biofilm.

And this seems to be one of the major reasons also for fallbacks or relapses of patients. Many of the formerly used treatment protocols has done a good job for many of these so-called pleomorphic forms of these bacteria's. But it was completely ignoring the effect of these microcolonies in the connective tissue. And, you know, this is for Bartonella and also confirmed for Borrelia, one of the safest places on earth, so comparable with the intracellular environment. So connective tissue that are your tendons, your ligaments, the joint capsules, but even the preventative tissue around any nerve is out of the same material. And unfortunately, connective tissue isn't blood flooded, it's lacking of arteries and veins and that means there's no presence of immunocompetent cells.

It's a rare finding to find macrophages or even specific killer cells or antibodies in connective tissue. So this is different to, well, a blood flooded organ system. You can build up very early a certain concentration of antimicrobial substances. And the persister forms are becoming a serious problem

and requires completely different treatment approaches.

So we know from conventional treatment approaches, they are more or less three different protocols recommended. All of them multidrug, that means triple courses of antimicrobial substances, it means three antibiotics at the same time. Only with that approach you have good chances of eradication. While most of the other formerly used treatment protocols have failed.

Kirsty Cullen - [00:29:42]

So finally, then, for this discussion, let's talk about cytomegalovirus or CMV, because obviously that's interesting in that it remains in the body and there's an element of reactivation for those who are immunocompromised.

Dr. Carsten Nicolaus

Again, this is the problem we have discussed before, and this is mainly one of the big differences between most of the bacterial infections, the viruses. Unfortunately we have learned that many of the viruses, if they have once entered your organism, it will stay the whole of your life. And it's more or less a matter of the immune capacity to deal with this infection. And based on that fact, so we can expect, if at a later point, if there's any immunocompromising effect, could be another illness, an acute infection like a flu or a very serious form of a cold, for example, with the common viruses or any other forms of stress, could lead to reactivation.

Stress in any form, and this is also important information for all the listeners, are most often the reason for the acute deterioration, decompensation of our immune system. That could be physical stress, emotional stress, mental stress, which have been direct and very short term effect on our immune function.

And as I mentioned before, if we are dealing with viruses which are well known to stay for your whole life after entering your organism, then you can expect more often these reactivations. And getting older, so mostly 50 and older, these patients have also an additional problem for reactivation of this certain viral infection. And for these patients it's so important to try a good lifestyle, probably a healthy diet to enhance the immune capacity, so different approaches. And also we have some effects based on antiviral medication that could be the real ones or also alternative ones. They are good herbal antiviral protocols available meanwhile, to enhance the immune capacity and also to take more specific care for the presence of these viral infections.

Kirsty Cullen

So in your clinical experience, do you see a high percentage of chronic fatigue patients who have chronic and reactivated infections?

Dr. Carsten Nicolaus

Yes. At the beginning being focused only on Lyme and its co-infection, I was noticing that, I would suggest minimum 90 percent of my patients had serious problems, tiredness and fatigue. So exactly what we call, meanwhile, the chronic fatigue syndrome.

If you look at that from the angle of chronic fatigue patients, it's quite obvious, doing research, that minimum 80 to 90 percent are suggested they're having issues with chronic infection. So as we have discussed so far, it could be a viral source, it could be a bacterial infection, but also some parasitic infection could cause the same.

Kirsty Cullen - [00:33:33]

So what kind of options do we have clinically to support people with tick-borne disease or chronic infections and fatigue? What are some of the protocols that you like to use?

Dr. Carsten Nicolaus

To make it short the main issue is you can't ignore the accompanying health conditions, like chronic fatigue and others. That means we have, in parallel, three issues at the same time. We have the chronic infection. Chronic infection automatically leads to chronic inflammatory processes. So that means in an acute infection we have up regulation of certain cytokines, which are the markers for inflammation. And this is pretty much the same for chronic infections.

Again, chronic infection will lead to a constantly up regulation of inflammatory cytokines. And the cytokines are also playing an important part or major part in presenting symptoms and complaints. And the third issue is the immunosuppression, that is what a colleague of mine, Dr. Horwitz, has called the three important I's, infection, inflammation and immunosuppression. This is exactly what we need for proper treatment. Only to focus on the infection is definitely not the best approach and is not taking care for the other health conditions.

So if you want to get the best outcome, you should treat patient and in parallel with antimicrobial substances or antiviral substances, with anti-inflammatory support and immune enhancement, to take care, for example, for the chronic fatigue to enhance the energy level. And that could be done on certain levels as well.

Kirsty Cullen

So, would that be extra mitochondrial support that you would add in to that kind of protocol?

Dr. Carsten Nicolaus

Yeah, so this mitochondrial support is so essential in treatment due to two reasons. One reason is what we have discussed before, to enhance the energy level. So, for example, with coenzyme Q10 you can definitely get patients on the higher energy level. This coenzyme Q10 is also required in any forms of long term antibacterial treatment. You need a certain amount of coenzyme Q10 to prevent patients from getting mitochondriopathie, which is a major issue in running long term treatment with antibiotics.

Another good support is, for example, basically to treat patients with NADH to enhance the energy levels. Or, this is more recently introduced, the NAD+ that seems to be one of the best supports from my prospective. Meanwhile, because I have long term experience in dealing with these patients that we have introduced very early, the coenzyme Q10, later on combination of CoQ10 and NADH. But when I first had access to NAD+, first in IV form then in oral forms, I have definitely noticed a much faster response of my patients with chronic fatigue and to get them on a higher energy level. This is definitely variable recommendable.

Kirsty Cullen

Interesting and of course...

Dr. Carsten Nicolaus

Other stuff is also doing, so mild support is definitely general immune support. Another good support is based on the glutathione, which also is enhancing the energy level. And very well known substance is LDN Low-Dose Naltrexone, which is objectively based on good science as a really very good support to enhance the energy levels in patients with chronic fatigue.

Kirsty Cullen - [00:37:53]

So how often would you say that you see a misdiagnosis around tick-borne disease? And how do we best differentiate between tick-borne disease and chronic fatigue?

Dr. Carsten Nicolaus

I would suggest very often. So, I've seen a lot of patients who have been directed by other specialists who specialized on chronic fatigue, and all of these patients have been pre diagnosed with EBV infection, I would say a minimum 90 percent of the patients I have seen, sometimes some other viruses. But when it comes to the bacterial infection, specifically the tick-borne diseases, this was a more rarely finding.

And I guess there's some urgent need really to spread this information widely to many, many other GP's that specifically, if someone is dealing with chronic fatigue, it's definitely wise to dig deeper and to be open minded also for the tick-borne diseases, specifically while we have noticed the wide spread of those ones.

So Borrelia is seen in many parts of the U.K, meanwhile. It's the same for Bartonella, it's the same for Babesia. And as we have noticed, there's year by year, a constant increase of these issues. So it's definitely wise to include this field of tick-borne diseases, even in the diagnostic and later on, if it's confirmed, in the treatment approaches of patients with chronic fatigue.

Kirsty Cullen

And of course, you've already alluded to it, the actual infection aside, of course there are other challenges around the immune response, including the inflammatory response. What testing would you recommend to practitioners to allow us to differentiate between infection and inflammation?

Dr. Carsten Nicolaus

This is a very good question. And I'm so happy that you have asked this question. For a long time, and that was one of the criticisms in diagnosing these, in general the infectious diseases. We have used only the serology, some PCR, but very early also on the T cellular testing. So many of you are very familiar with the lymphocyte transformation testing, which was the first generation followed by the ELISpot. And the criticism was most often none of these testing tools had been able to differentiate between the infection and the inflammation. The only test method at the moment is the iSpot testing, so this is the last generation of T cellular testing, which includes two different cytokines at the same time. And this was born on ideas we have in collaboration with a manufacturer in Germany who was the first introducing the ELISpot technique on the German market. And my former clinic was the first clinic at all in Germany using that test method.

But we have included only in those days, the Interferon Gamma Release, which is more or less representing the activity of the infections. And the criticism was, at that time and later on as well, because we have ignored the inflammatory site of the illnesses. And so the idea was born very early to look for other interleukins at the same time and over a period of 5 years, so starting around about 2007, we have double checked many different types, starting with Interleukin-2, Interleukin-6 and all the others to find out which is the best representative to find a short solution for the patient.

You know, you can definitely ask your routine lab for doing an inflammatory profile. Unfortunately, these ones, including most or all of the interleukins, including the different gamma and ABAs, are very expensive. So on average, you can easily spend within 1000 GBP or 1500 GBP for the testing. And this is a big load for patients, specifically when you have to pay everything out of your own pocket.

And so we have this idea to include one of these interleukins in the T cellular testing even to get exactly this information and being able later on to differentiate between the infectious disease activity and the inflammatory activity. And finally, we decided a long time ago for Interleukin-2, and this is exactly a routine testing, which is meanwhile available from certain labs, offering and this technique is called iSpot, iSpot automatically includes these cytokines, and you can exactly see the differentiation

between the inflammatory activity and the infectious disease activity.

And so while doing so, we have learned a lot to see in general different types of responses of patients. And with this technique, we can also optimize our treatment. Having access to this information you can, and specifically the differentiation between inflammation and infection, you can optimize your treatment in a sense of going only on antimicrobial substances if it's needed. To change on anti inflammatory substances when it's appropriate. And that is good for, let's say, financial reasons, but also being not any more exposed to the risks of long term antibiotic trials if it's not any more needed.

Kirsty Cullen - [00:44:11]

So clinically useful. Carsten, we really appreciate your time in explaining that. But if your listeners want to find out a little bit more about your work and that work specifically, where should we direct them to?

Dr. Carsten Nicolaus

You can go on the websites of these certain labs offering the iSpot technique, and there are not many at the moment unfortunately, to pick up all this information. And this is really essential. I can look back now on a very long time using these types of testing. And we have noticed specifically after setting up a new lab in the U.S. that many of the American colleagues, meanwhile, are very keen to include that in their diagnostic services.

And again, so the T cellular testing, and this is so important, is one of the most sensitive test tools. But I don't see that in the sense of a diagnostic tool. For me, the advantages for the monitoring purposes are more important. You know, you can't use the IG and the serology to optimize your treatment. Definitely not. It's the same with PCR, PCS, the direct testing to get evidence of presence of these bacteria's but you can't read all of the testing, how to optimize your antimicrobial support or how to optimize your anti inflammatory support. And actually this is only based on the T cellular testing's.

Kirsty Cullen

And Dr. Nicolaus, am I right in thinking you have your own website also?

Dr. Carsten Nicolaus

Yes, of course. This is drcarstennicolaus.com. You can get a lot of information and also on the website of certain labs as well.

Kirsty Cullen

Perfect.

Dr. Carsten Nicolaus

Might be it is of importance, we are actually very active in the background. You know, after the close of the BCA lab after setting up a new one, which is coming soon. And the new one will be also offering services here in the U.K. to get access to all these forms of testing's.

Kirsty Cullen

Fantastic. Huge gratitude, again, for your time today. It's been a pleasure.

Dr. Carsten Nicolaus

Same for me. And I'm so excited to get the opportunity to give you all this background information, you know.

So I'm not for, not at least with some interruption for 5 months in the U.K. before I was here on the monthly base to support some clinical institutions here to get better insight of tick-borne diseases.

But so what I've noticed over the past couple of months is that the U.K. is actually at the point where I have been, and let's say, round about 2006, unfortunately hopefully that's not too impolite to mention that, but U.K. regarding tick-borne diseases, much behind many of the other European countries regarding tick-borne diseases. And so my aim is really to support here. The support groups and voluntary groups, even to spread some more information and to keep everything much better running so that patients with tick-borne diseases and all these accompanying health conditions will get better acceptance somewhere in the future, and that they can get definitely access to much better diagnostic and treatment.

And I guess it's possible, and I'm so thankful for today's opportunity to give all this information. And I'm very much driven to move forward in that way, and now being a resident here in the U.K. to give my very best to improve all these things as well.

Kirsty Cullen - [00:48:31]

Yes, it's a hugely important conversation to have and to keep having because obviously the landscape changes all the time. So we really appreciate your input.

Dr. Carsten Nicolaus

It was a pleasure. Thank you for inviting me.