Highlights from the International Lyme and Associated Diseases (ILADS), 18th Annual Scientific Conference - Boston

Lyme disease is an illness caused by the bacteria *Borrelia burgdorferi*, a complex microbe known as a spirochete. Lyme disease is a multi-systemic illness, if left untreated it can become a severely debilitating illness affecting the central nervous system, joints, and multiple organs, including the heart and brain. It presents in multiple-stages from: acute (early stage) to chronic (late stage or persisting) illness.

The CDC estimates over 300,000 people in the United States are diagnosed with Lyme disease each year. It is one of the fastest growing infectious diseases in the U.S. and Western Europe.

The Global Lyme Alliance is pleased to present Highlights from ILADS 18th Annual Scientific Conference, our expert panel of leading physicians will provide their insights and a summary of key data and research presented at this conference.

The patient panel includes Jackie Bailey and Jennifer Crystal. Jackie is a Nurse Practitioner at Apheresis Associates of Northern Virginia (AANV). She has been performing physical exams on donors since 2010. She has extensive experience working as a Family Nurse Practitioner. Jennifer is a writer and educator at Boston. She is working on a memoir about her journey with chronic tick-borne illness.

Lyme Disease talks are conducted in association with Global Lyme Alliance.

Full Transcript:

Priya Menon: This is Priya Menon, your host, joining you from India. Today on CureTalks we are discussing Lyme Disease. Lyme disease is an illness caused by the bacteria *Borrelia burgdorferi*, a complex microbe known as a spirochete. Lyme disease is a multi-systemic illness, if left untreated it can become severely debilitating, and can affect multiple organs, including the central nervous system, joints, heart and brain. It presents in multiple-stages from acute to chronic illness. Global Lyme Alliance is pleased to present this Web talk, “Highlights from the 18th Annual International Lyme and Associated Diseases (ILADS) Scientific Conference. An important conference bringing together leading physicians, scientists, and others with expertise in tick-borne diseases to share important research updates, and other evidence-based clinical data with their peers. Today’s talk will cover a summary of key data and information presented here.Good evening and welcome to CureTalks.

I welcome the experts on the panel. Dr. Kenneth Leigner, Lyme disease expert, is on the Board of Directors of The International Lyme and Associated Diseases Society (www.ilads.org), the Scientific Advisory Board of the Lyme Disease Association among others.

Dr. Samuel Shor Associate Clinical Professor, George Washington University Health Care Sciences. Dr. Thomas Moorcraft is a board certified in Family Medicine and Osteopathic Manipulative Treatment. Leo J. Shea III, Clinical Associate Professor of Rehabilitation Medicine at Rusk Institute. He also serves on the Scientific and Community Advisory Board for the study of Lyme disease at Stanford University Medical Center. Welcome to CureTalks everyone.

The patient panel includes Jackie Bailey and Jennifer Crystal. Jackie is a Nurse Practitioner at Apheresis Associates of Northern Virginia (AANV). Jennifer is a writer and educator working on a memoir about her journey with chronic tick-borne illness. Welcome to CureTalks Jackie and Jennifer.

I will give you brief outline of the talk today. Jackie Bailey will begin with the discussion followed by Jennifer Crystal. Towards the end of the talk, we will be taking in questions from the audience. The dial-in to ask your question LIVE is 718-664-6574. I repeat 718-664-6574. This number has been posted on Curetalks.com webpage as well, and we will be repeating this number before we begin the QA. You can also post your question in the comment section of the curetalks page or email me priya@trialx.com with the same.

I once again welcome everyone to today's episode of CureTalks.

With that, I will now handover to Jackie to begin with the discussion. Jackie over to you.

Jackie Bailey: Thank you Priya. I am a nurse practitioner, Northern Virginia as well as chronic Lyme patient. I have a typical story of many lyme patients, in that, I did not see a tick or did not have a bulls eye rash. I did not have lot of the classic signs and symptoms that I learned about in school, such as bell's palsy or swollen knees. So it took many medical providers to figure out what was going on when I first presented. I had a false negative ELIZA and a misdiagnosis. Then I was finally lucky enough to see a doctor who is well educated about Lyme and testing. I have been treating for a year and I have been doing great and transitioning to herbals now after a year of Antibiotics. I really enjoyed attending the 2017 ILADS conference and I have a few questions for a doctor panel.

I am going to start with Dr. Leigner. My first question is – During Dr Mozayeni's presentation on Bartonella, he stated that some western blots that are only IgM positive can actually be Bartonella infection. Bartonella is a co-infection of Lyme disease but is also common by itself as well. He went on to describe how both Bartonella and Lyme affect the nervous system as well as cause collagen deficit. What measures can a clinician use to determine which infections their patient is dealing with or do we need to rely on empiric treatment until tests improve? Thank You

Dr. Kenneth Leigner: As with any medical condition, eliciting the history is extremely important both for lyme and Bartonellosis and also sometimes there are distinguishing features on physical examination that can point to one or another of these disorders. There is a lot of attention to the unusual skin striae which may be seen in Bartonellosis and to the work of Dr Mozayeni and his collaboration including Dr. Brych.. were recently have been able to really demonstrate that, often these striae, when they are related to Bartonella, you really can prove that by doing biopsies and by doing what is called immunohistochemistry or sometime also PCR. Sometime that can be a distinguishing feature. But as you mentioned, there can be quite a bit of overlap between Lyme and Bartonella and it really can be quite confusing, and it can take some time to sort out.

Let me just get back to the back to the IgM western blot, I presume you were talking about lyme IgM western blot that Dr Mozayeni is saying that can be falsely positive or positive in non-specific ways in Bartonellosis. I don't know all the rationale for Dr. Mozayeni's observation. But certainly you can get false positive IgM western blot in Lyme disease, not just in Bartonella as Dr. Mozayani is stating, but also through other acute conditions. Barlow infection can give you false positives.

So in sometimes the response to treatment and the application of treatment can help to tease apart overtime what you're dealing with, because treatments that works for lyme disease might not be adequate for

Bartonella, for example, Amoxicillin is very helpful for Lyme disease, but in my experience has been very terribly helpful in Bartonellosis. So if you introduced treatment in, somewhat of a stage or sequential fashion, you can sometimes tease apart what is responding to treatment in lyme disease and what is responding to treatment in Bartonella. Many of us would use a combination of either a tetracycline, or so called Azalide, such as azithromycin or clarithromycin along with trephantan.

That combination many of us find to be very useful for Bartonellosis and sometime you will see clinical features respond to that type of treatment that do not respond to just for lyme disease. For example Ceftriaxone which many people use for serious cases of lyme disease. it is notable for its impact on Bartonella. Failure of somethings to resolve with the Ceftriaxone might suggest that there might be a Bartonella co-infection. And finally there are direct detection methods PCR for example, that one is fortunate to detect a positive, that could help you to know with more certainty whether you are dealing with lyme or Bartonella or both.

Jackie Bailey: Thank You. There is a follow up to that regarding lyme Western Blot. Many patients who do have a positive IgM Western Blot do not seroconvert to IgG positive. Why is this the case in lyme disease and why does it differ from the normal immune response in other human infections?

Dr. Kenneth Leigner: Yes. You are absolutely right. When the person is first exposed, the immune response tends to be IgM. Then with the passage of time and often as the infection is vanquished IgM shuts off and..this is what is called – Class switch to IgG. There is a common belief that in lyme disease, one ought to ignore the IgM western blot except in the first month or two of illness. The problem is that in many patients who have lyme on a more chronic phase, that IgM persists. Not only that, often additional bands, including bands of high specificity will develop over time, that makes me think it is very unlikely that IgM reactivity is false. And of course there are other ways you can sometime substantiate that by direct detection methods.

The work of probably Nicole Baumgarth has probably been the most instructive into possibly explaining why that class switch from IgM to IgG does not occur or often does not occur in line, in a mouse model of lyme. She demonstrated the *Borrelia infection* completely disrupts the normal architecture of the lymph nodes. What we call germinal centers. That architecture is very important in a normal development of the immune response with different cells of the immune system being organized in three dimensions and presenting antigens and the germinal centers in mouse model, which are usually like little spheres sitting within the lymph nodes getting completely disrupted and disorganized. And a lot of us suspected that might explain why there often, is the failure of class switch from IgM to IgG. And there are probably other reasons as well.

Jackie Bailey: Thank You Dr. Leigner. My next question is for Dr. Shor. After attending the most recent ILADS conference, and during your term as ILADS president, can you let the patient community know what's new in terms of the treatment of lyme disease? Dr. Richard Horowitz talked about his new dapsone protocol. Can you tell us who would and wouldn't be a good candidate for treatment with dapsone?

Dr. Samuel Shor: Sure. The use of dapsone has traditionally been used for leprosy. It can we used particularly for those recalcitrant patients who not only have Borrelia , but also have the co-infection of Babesiosis, which is a parasite in the red blood cells. It is not a first line drug, but it has been shown when chosen carefully and monitored carefully because anemia can develop among other things. It may be a useful add-on in a second or third line priority. There are other interventions that are described in the conference.

Of particular note was the evidence based lecturer, De.Leone who discussed a number of herbals that have anti-borrelia activity or anti-bebesia activity. Artemisinin from Artemisia has been shown to affect persister cells which is a new and upcoming evolution of understanding why Borrelia can become chronic. but Artemisia has been shown at least in the test tube to have efficacy against persister cells. Curcumin, another herb has been shown to have efficacy for Bebesia. So these are just a few of the interventions described.

Jackie Bailey: Great! Can we discuss the evidence of persistent borrelia infection after antibiotic treatment

found in the 2012 Monica Embers study of rhesus macaques and the findings discussed at the conference of the NIH xeno diagnostic studies thus far or the Columbia University post mortem studies? And I am mostly interested in this because I want to know how I can determine, if I am still dealing with an active infection versus tissue damage or autoimmunity when I am looking at my symptoms.

Dr. Samuel Shor: Right. And you combined a couple of questions. So let me tease this out. In relation to Monica Ember study, she is one of the cutting edge researcher in the evaluation of non-human primates using rhesus macaque monkeys. The study to which you are eluding. The monkeys who were Borrelia naive, meaning that they were healthy beforehand, were infected with Borrelia infected ticks. 4 months after that inoculation, they were treated with the equivalent of human dose Doxycycline – 100mg twice daily for a month. 6 months after completion of the antibiotics, there was a feeding of the Borrelia naive ticks that have not been fed before, so that to determine whether in fact there was an ongoing infection in these non-human primates. in fact in the 3 and 6 months follow up studies evaluation of those fed ticks were positive. Many of them were positive – PCR and culture positive for Borrelia . So that was consistent with the presence of circulating Borrelia infection in those monkey's that have been treated with what many consider to be an adequate treatment course for lyme disease. Obviously not the case in this setting. The monkeys were subsequently sacrificed to 8 months after antibiotics.

Her 2nd study dealt with the multiple organ involvement on necropsy. Post they identified the infection in the brain peripheral nerves and skeletal muscle in the heart among other locations. So this is very strong evidence that the antibiotics that are used for a month – at least the Doxycyclin course – in this say, it was inadequate to clear the infection.

With respect to how do you determine whether you got active infection or not. To first set the stage for what is generally used. The technology traditionally used to test for lyme disease is characterised as a 2 tier system. The first tier in that 2 tier system is a technology called ELIZA, which is inexpensive and supposed to be sensitive. It is then followed by, confirmatory western blot, which is supposed to be more specific to the infection. Unfortunately there is plethora of evidence in the literature to indicate that that technology approach is not very sensitive, and, on average about 50% sensitive. In addition, if measuring the body's immune or antibody response, and so that if it is positive, one can definitively say, that there is an active infection just from that test. All one can say is there has been exposure to the organism.

There is other technology that is available that unfortunately is not very sensitive. That if positive, generally it would be consistent with an active infection. Dr. Leigner alluded to PCR which measures the genetic material of the particular organism in this setting. We are talking about *Borrelia burgdorferi.* There are also availability of cultures, but neither one are very sensitive. There was new technology that was discussed at the conference that is promising, but I am not ready for prime time. Nanotrap is a urine antigen test. The antigen is the protein representative of the infection, so that, if present, would be consistent with an active infection. There was discussion by Dr. Falon of the metagenomic sequencing of multiple pathogens which holds a significant promise but again is early in its development. Then there is a stimulation of T cells which is a part of the immune system that can be stimulated even earlier than antibody production. And that seems to be promising as well. But that is ealy research. And then there is work being done by John Alcott's group to measure immune markers called chemokines and cytokines – they are associated with the infectious process. But that has also to be clarified as to what role that would play in the diagnostic, well, paradigm that we seek.

Jackie Bailey: Thank You. It is a lot of good information. Dr. Moorcraft. Good Evening. Can you address the role of both heavy metals and mold and mycotoxins in the clinical picture of a chronic lyme patient? And what can be done to address these possible environmental toxins?

Dr. Thomas Moorcraft: Well. I think these are, two really important pieces in treatment of chronic lyme because, rightfully so we need to focus on these persistent infections. We have learned so much about all the different mechanisms they have for evading our immune system and such. But in most of the patients I see there is more than one factor at play and that could be a co-infection like lyme and Bartonellosis. We

often, we have lyme, Bartonellla, as well as heavy metals and maybe some mould toxins. So there is usually a combination. So what I find both with the mould and heavy metals, primarily boils down to inflammatory response. I kind of look at things, you know, where we are trying to find the root cause of the illness. In any of that, whatever that root cause is, it creates a toxic effect on the body. These toxic effects are really the things that are generating inflammation. And inflammation is that piece that leads to the signs and symptoms that all of us have come to know as associated with these diseases.

For example, like a heavy metal , mercury and lead, are very commonly elevated. I really try to make a distinction between an acute toxicity event which is one thing, in what I typically see which is a chronic burden, which would be more like, the kids who go to kindergarten with a backpack they might have a lunch in it or a pair of gloves. But by the time they are in middle school they are 40-50 types of books in their backpacks. So these heavy metals are kind of weighing them down and it can suppress immune function. Decrease nerve conduction, velocity. A lot of our patients with brain fog and have this sort of inability to heal. It is like an Achilles heel. Heavy metals can be part of that.

Also, some work has been done on Kryptopyrroluria. It looks like some major physical stressors or emotional stressors including chronic infections can trigger genetic pathways, that leads to us losing some minerals and vitamins, at a faster rate than we would have, if we did not have Lyme. And so in turn often we find those patients having elevated levels of metals. And so it seems like, rather than putting the minerals back into the tissues and the bone, we are actually putting the heavy metals in. So a lot of our patients with lyme disease, end up having heavy metals at a much higher rate.

If we look at the mould mycotoxins, I think we have 2 sort of, major things going on. You can have mould and then have a mould exposure, and you may have a difficult time detoxifying the mould toxins. And the other one is that it can become chronically colonized. Then we generally are looking at places like the nasal sinus cavities, or as Dr. Brewer talks about or also, in the gut. So, these are kind of the major pieces we are looking at and in either event if its just the difficulty detoxifying because our Human leukocyte antigens are not doing their jobs properly. Kind of like Dr. Shoemaker talks about or if its a colonization or little bit of both. It boils down to – we need to really get people out of this environmental exposure and you know, like mould you may need to move out.

And if we looked over at heavy metals, we might actually have to think about maybe removing heavy metals, maybe removing Mercury amalgam if that's the case. And then we need to Detox the patient. And there are many different ways to do that and one of the pieces that we see across different protocols, is that once we started to detoxify the patient, we also need to bind them. You will see a lot of use of cholestyramine and activated charcoal. And there is a whole bunch of other types of binders that have been coming out to really suit the needs of our chronically ill patients. But there needs to be a binding, so that we don't just dump the toxin to the colon and reabsorb them.

And then another piece that I always try to, help people understand is that our bodies are fantastic at healing. And our lymphatic system really relies a lot on movement so, Any kind of movement you know you see people walking, and rebounding and just kind of up and down. If you do a little bit of activity that's good too. But anything that's going to get you breath a little heavy, moving your hands and legs and really take advantage of the natural detoxifying system of the body are also going to be things that are helpful in these situations.

Jackie Bailey: Thanks. You also spoke at the conference the importance of sleep. Talking with the other patient moderator on the call Jennifer Crystal we both noted insomnia is the major part of our presentation with tick borne disease. How can lyme patients improve their sleep and what can be done if herbals and prescription sleep aids fail?

Dr. Thomas Moorcraft: That's a great question. You know sleep is so important to feeling.And you know I think my patients also have the same experience That both you and Jennifer have had with insomnia being a huge piece. So from a sleep perspective, certainly prescription sleep aids can be helpful. I often find that

they create more trouble, than they are worth, in my particular patient population. But I do use them and there is a myriad of ones that work on different receptors. And certainly working with the doctor to go through those, if they are appropriate, could potentially be helpful. I kind of find that, if you had two, and if it hasn't really worked, it's probably not going to end up working from the pharmaceutical perspective.

From the perspective of some of the herbal and natural things that you can do. People talk a lot about these. Melatonin which is a sort of a natural hormone, that our brain makes – a little plant called the pineal gland, which helps regulate circadian rhythm and such. The problem is that a lot of people get some kind of grogginess in the morning, once they are sleeping with melatonin. And I have actually, I kind of like the salmon version of melatonin to alleviate that morning grogginess, and that's been very successful for patients. People can also think about things like 5 HTP which is a precursor to serotonin. Because serotonin then lead to the production of melatonin. Additionally GABA is an inhibitory neurotransmitter. So it kind of puts the brakes on the brain, and lets you, kind of take that edge off of some anxiety. People can come down that ways, and it help induce sleep.

And Nasotar is another thing that really works well that ways. And one Tried and true trick is To use a little bit of magnesium. It's good to calm the muscles down. And help with spasm and a little bit of pain, What is also very calming to the nervous system. So when those things don't work one of the things that I ask a lot about is, just like when people get up? If they are able to fall asleep but they are waking up at 2 or 3 in the morning, often times it happens that they actually are hypoglycemic, they have low blood sugar, they have to release some Cortisol, So that they can mobilize some of the body is stored sugars. And one way to combat that is, Instead of being hungry in the middle of the night, Would be to have a light complex carbohydrate meal right before you go to bed. There is a lot of science behind it and it's really nice. If you want your cortisol levels to be down, you have more carbohydrate. Just like in the morning I tend to have a low carbohydrate high protein meal in the morning so that I can Allow my cortisol to naturally come up. So if we regulate are cortisol in the morning and in the evening that can be very helpful.

Other tricks people can try, if they work for you you can see results in a week or two, Sometimes a couple of days. A lot of my patients Are sensitive to Wi-Fi. So I just have them put their Wifi on a timer so that it gets turned off at bedtime and then turns back on in the morning. Some people will go through a little bit of a Detox response, over the first couple of days, and then that cleared out and then they usually sleep a lot better.

Another thing is that we have a lot of lights on at night. So Blue blocker lenses which you can get on online outlets for anywhere from 7 bucks to all the way up to designer kinds. They are going to block the blue light. So you are going to get Eliza yellowish Orange tint to what your looking at but it really helps preserve your natural so circadian rhythm and your melatonin levels. When things get out of control and you are staying up all night – There is a thing called wait therapy, often called sleep deprivation therapy, Where people can count the amount of time they are actually sleeping at night. Say I want to get up at 6 o'clock, I only sleep 4 hours, so I am going to bed at 2. And they basically make them over the course of a week or two, they ratchet that back Tour full 8 hours. It's essentially exhaustion therapy. I don't find we have to go there too much, by trying some of the Other tricks we talked about. So these are some things that I found to be pretty helpful in our chronic lyme patients.

Jackie Bailey: Great Advice!. All right next, Dr. Shea. After seeing many medical providers to get a diagnosis, I like many other patients was told that my symptoms could be psychosomatic and to go see a psychiatrist. I was frustrated but I did go. It was the psychiatrist who upon listening to my symptoms, diagnosed lyme disease and confirmed the diagnosis via western blot. What are some key psychological presentations seen with tick borne disease? Also, what signs and symptoms should parents look for in a pediatric patient?

Dr. Leo J Shea III: I think that it kind of needs to be broken down into three different areas. One is cognition or how one thinks. Another one is emotion or how one feels. And the third is behaviour – how one acts? Typically in an adult population, after or even prior to a diagnosis, a person is feeling out of sorts and, and

generally goes to have their organic capacities is evaluated. And that would result in either an individual being diagnosed – either with the illness or not having a diagnosis, and having been told to go to a psychiatrist. The question of going to a psychiatrist on that basis, Is whether the psychiatrist is in fact, a lyme literate psychiatrist, and has an understanding of the organicity of *Borrelia burgdorferi* or the other tick Borne illnesses.

And if not then you are going to have some difficulty. But if they do and you were lucky enough to meet a psychiatrist who is knowledgeable of that, they typically will recommend depending on what they see, whether it's a cognitive process or and emotional process. A course of medication and then also a neuropsychological evaluation, do better define how to better define how the cognitive domain have been affected. In paediatric cases we one of the things that one has to look for is the information that has been provided by the parent, about the change in their child's study habits, the change in the child's behaviour. And of the parent does not see that, there can be diverse reasons, for why the family unit does not recognise that. There may be some difficulty within the family unit. There may not be a good communication sense. But the school may represent complaints that show that the child, on the report card or on the behaviour has declined, from where they were. And at that point what very often happens is, the school recommends that the parent have child to be seen for an evaluation usually of cognitive evaluation.

That can be done by a school psychologist but what most often happens is, the school psychologist is not aware of the tick Borne illness or the presentations of a tick Borne illness. The typical thing that happens is that the child is declared as having attention deficit disorder. And if its a behavioural thing, the diagnosis is bipolar disorder or emotionally disruptive disorder or emotional disorder. Most often paediatric cases that have the diagnosis of lyme disease and multiple co-infections, do not have a diagnosis of attention deficit disorder. It happens to be that because of the illness, there are tensional traits which decline, but that does not diagnose attention deficit disorder. But more often than not when school psychologist see this, the typical diagnosis is attention deficit disorder, which is an incorrect diagnosis of the children. It leads to incorrect treatments.

Jackie Bailey: You mentioned that family unit, the support of my family was a huge factor in my improvement, thus far, and I am aware that some patients do not have family or social support and feel very isolated or abandoned. Why does lyme disease and other tick-borne disease affect human relationships and the family unit? Is there a role for family therapy?

Dr. Leo J Shea III: Well, my axiomatic thought on this is, lyme disease and other tick borne illnesses are family illness and not an individual illness. The individual may bring the illness and first diagnosed, but the likelihood is that the other members of the family that will have it also, because they typically live within the same environment. They vacation in the same environment. And while they have not been diagnosed there is a likelihood that they may have it. That being said, if only one person in the family have a diagnosis, that immediately causes changes in all of the roles of the family members. That individual becomes the focus of attention. That can cause tensions between spouses who may feel that the child is being tended to. Siblings may feel that child is getting too much attention and they are not being paid attention to and therefore they go and seek other kinds of support systems which can be detrimental.

Any time that I have an individual who is diagnosed with lyme disease and live within a family structure, I always ask for a family meeting and generally suggest that they have family therapy. Part of that is psychoeducational so that everybody in the family is on the same page. And they understand not only what is happening but what will happen in the future. And is to provide them both insight as well as hope. I teach that here in NYU medical center to all the interns because I am the co-director of family therapy here in. It is very important for them to understand that when an individual has an illness that becomes an illness that changes the role of the family or the peer group in which they function. If one does not have a family member, a singular person, they typically have friends or if they don't have a collection of friends, they can't feel they can reach out to them, there are support groups available that they can go to.

Jackie Bailey: Thank you. Thank you to all the doctors for their answers. Next I am going to introduce our

next patient moderator Jennifer crystal. Jennifer can you please tell us a little bit about your experience with lyme disease.

Jennifer Crystal: Sure. Thank you so much for having me. And welcome to the doctors. I have been a patient of tick borne illness for 20 years and the illnesses were undiagnosed for this first 8 years of that process. I battled many of the worst physical and neurological symptoms of lyme, bebisia, and erlichia. After severe relapse about a decade ago, I have moved from bedridden to remission. And now still have some limitations, I am grateful to now be living a relatively normal life that includes writing, teaching, exercising and socializing. I rather weekly come to the Global Lyme Alliance, and completing a memoir about my medical trajectory. I love being able to connect to other patients to my writing. Also enjoy serving as a communication liaison between doctors and patients. I am really excited to join you all today and to ask them questions as Jackie did, about what you learnt at the ILADS conference.

So, I will jump off of Jackie's questions. I am going to start off with a question for Dr. Leigner and first is that different doctors at ILADS focused on research and treatment of co-infections, one of which has been mentioned before, which is Bartonella, which for listeners are infections other than Lyme disease than you can get from a tick bite. Can you talk about what you learned at the conference about various co-infections, and how those findings might inform your treatment of other infections?

Dr. Kenneth Leigner: Thank you Jennifer. Well, there was quite a big focus at Boston conference on relapsing fever. There were 3 different speakers who gave excellent presentations. And by the way I just want to comment that, all together there were 50 some presentations and lot of them were given during parallel track. So you could not go to all of them at the same time fortunately. We got powerpoints and were able to review them. But there was quite a richness of the offerings there and a lot of them were very high quality. In terms of the co-infection that I commonly encounter that are most problematic, to me its lyme, Bartonella, and bebesia. Those are kind of big ones because, each of them, I use this term – a penchant for persistence. But in terms of what was focussed on at the conference, there was quite a focus on relapsing fever. Valley Cutler who is from Great Britain gave a great talk on relapsing fever in Africa and worldwide.

Dr Ogo from Nigeria talked about relapsing fever in Africa. Diego Cadavid gave a great talk on the pathology of relapsing fever. So we have learnt, fairly recently that in addition to the lyme organism, there is another Borrelia that is fairly common in the same tick that can transmit lyme, that is to say that deer tick. But it turns out that it is not lyme, And the name that is given to that is *Borrelia Miyamotoi* – Which was first described in Japan in 1994. And actually there is an Entomologist currently at Yale, Dorland Fish who, many years ago perceived correctly that there is another Borrelia in the deer tick, and he tried to get people's attention. He is pretty well connected to the biomedical research establishment. He basically got ignored until about 10 or 15 years ago. In the former Soviet Union there were human cases of that described. And all of a sudden there was a lot more interest. In the last number of years there has been no supported research on *Borrelia Miyamotoi.* There was a case that was described in western New Jersey in Hunterdon county of an elderly woman who had meningitis. They look at her spinal fluid and they could see numbers of Borrelia in the spinal fluid and that is unusual for lyme. Because lyme is as usual not present in large numbers. So relapsing fever causing organisms like *Borrelia Miyamotoi* are often in the blood, for example, in large numbers, where they can be fairy readily seen under light microscopy.

Anyway that case was reported in the new England Journal of Medicine, not too many years ago, so there has been a lot more focus on that. The treatment for relapsing fever *Borrelia Miyamotoi,* is similar to lyme. Although it is less know about the natural history of *Borrelia Miyamotoi* relapsing fever than there is of Lyme disease. The other think about relapsing fever is that in other parts of the world and even in the american west a different kind of tick typically will carry the relapsing fever organisms what are called the soft ticks in the west – Ornithodoros. In Africa there are many others, they call them organic ticks. Those ticks unike a deer tick, which attaches and stays on for a days of time, these other ticks they feed very briefly. So they often bite people during sleeping time, and they don't even realise that they have a tick attachment.

So the other thing about relapsing fever in Africa, the Borreliosis in Africa are not what we call reportable

diseases. Like in this country Lyme is reportable diseases but in Africa it is not reportable. There is much more focus in Africa on other infections like Malaria. So what Dr. Ogo pointed out that often times people will have high fever, and it will be assumed that they have malaria and they will be treated as for Malaria, but the infection won't respond, because it is actually a Borreliosis. That is a big problem. So, I did not see too much at the conference about Babesiosis, but that is also a very big problem and the treatment of that is quite different than the treatment of lyme disease. Could I answer your question Jennifer?

Jennifer Crystal: No, that is great. Is is important for our patients to hear about other diseases other than lyme, to know how there are issues world wide. But that is very helpful.

Dr. Kenneth Leigner: I completely agree with you. Both lyme disease and the relapsing fever Borreliosis are global phenomenon. It is not just in the US or a single continent.

Jennifer Crystal: And not just in New England that many people think.

Dr. Kenneth Leigner: Not at all. I think almost every state in the US has had cases reported. May be Hawaii might be one state that has not been reported. I am not sure about that.

Jennifer Crystal: That is alright. It is so important for everyone to hear that. Another question I wanted to ask you. During a panel Q and A at the conference, you mentioned that Lyme is variable—that some people are devastated by it, and some people are able to keep it in check. This has certainly been true in my own experience; I personally was devastated by it, but I know other patients have had an easier time fighting it off, while others have been even more severely debilitated than I was. Can you explain why Lyme is so variable?

Dr. Kenneth Leigner: Well, for one thing it has been recognized that there are many different strains of *Borrelia Burgdorferi* and some of the strains may be more virulent. And some may focus on different organ systems. Such as the nervous system or the heart. So part of it is what strain happens to infect you and then things more complicated – people who live in endemic or tick infested areas, they often get bitten by more than one tick and is very possible that more than one strain can infect and affect them. They are on top of the different strain variations. Each human obviously has a different immunogenetics and it has been very well demonstrated in a mouse model. in fact, Dr. Cadavid talking about relapsing fever was pointing out that some strains in mice can be infected and have a very very mild illness and other strains of mice have a devastating illness. Janice Vice, a PhD at University of Utah has also shown very similar things for lyme disease. Depending on the strain of mouse, some can have very mild illness and some can have devastating Arthritis that completely in capacitates the animal.

So strains of mice can be inbred and you can sort things out, and look at different strains. In human beings each of us has a very complex immunogenetics. That is why it make it very difficult to make blanket statements about lyme is and how it presents and also, how it needs to be treated in any given person. So, many of us have found that you really do have to individualize the treatment to find out how intensive the treatment needs to be for given person. Some people respond very well to rather simple treatment. Others require combination of agents and some require parenteral – which means intravenous or intramuscular therapy and it is not like one size fits all. You can say everybody should be treated with this or everybody should be treated with that. For every person, their immunogenetics affect how they respond to the infection, but also immunogenetics determine how they handle different treatment options, how their liver metabolizes different antimicrobial agents or other supplements. So you really have to, be thoughtful and device a plan. Whatever plan you device you have to be willing to realize that you may have to revise the plan, depending on whether the patient tolerates the treatment, whether it is having good or bad effects. It requires a lot of improvisation, hopefully informed improvisation. You can't just make a blanket statement about how everybody should be treated. Everyone is different.

Jennifer Crystal: It is so important for the listeners to hear that. Thank you so much Dr. Leigner. My next question is for Dr. Shea. At the conference, a few doctors spoke to the fact that neurological and

psychological manifestations of Lyme are secondary to the disease, meaning that they are effects of Lyme, but not the root cause of a patient's problems. This was an important reminder for me, as a patient who has had to define that difference for others and recognize it for myself. What are some of the most common cognitive, emotional, and behavioral manifestations of tick borne illnesses that you see?

Dr. Leo J Shea III: I can certainly can speak to the psychological components. Depends on whether and individual brings a psychological component to the disease or the disease brings it to the individual. That is whole different question. More often than not, what happens is that the disease occurs, and then as s result of that certain psychological components fally forth, and that could be a result of organic effects of the disease or it could be a result of a characterological makeup of the individual in being able to deal with the disease.

So what most often happens is that the disease as it continues takes a toll on the individual's stamina and that takes a toll on their mental health. There are also neurological components of it that interfere with the cognitive aspects, how a person functions, so that their tension may be off, their memory may be off, their executive functions or their ability to multitask etc. When an individual recognize as those things, and that is more secondary than primary because often they don't recognize them immediately, but when they do recognize and become aware, then they become more concerned about the problem and that concern translates into anxiety and depression and therefore, it is important at that point at that point to make sure that an individual gets an intervention which is psychological in nature – Meaning either individual psychotherapy or if it is cognitive, individual cognitive mediation. But really the way to know that is to have a full psychological evaluation done. Because that will evaluate the level of cognitive impairment. It will also evaluate the level of emotional impairment.

And it will ask questions around how one deals with that which is the behavioral signs. Having had that done, then you can target a treatment protocol, whether it be individual psychotherapy – if those are the primary responses to this disease or if its is cognition, then that would be, more direct a therapy. It is never one or the other. Usually it is a combination of both cognitive problems exacerbate the psychological aspects of a person's functioning. There may be times when a person has a primary psychological problem that then opens up questions about cognition. But in this disease it is much more often that a person has the cognitive component. And then that bothers them, it either affects work, or school process, and that then causes a decline in their ability to function psychologically.

Jennifer Crystal: Ok thank you so much Dr. Shea. My next question is for Dr. Shor. One of the reasons my own case of Lyme went undiagnosed for so long is because testing is so faulty. Can you explain to listeners why current tests are so unreliable, and also talk about the latest research on diagnostics that we learned about at the conference?

Dr. Samuel Shor: Right. As it turns out there is an overlap between your and your colleagues questioning, so I have answered much of this, but to reiterate the high points and couple of other comments. One is, the emphasis is the 2 tier system that I mentioned earlier is not very sensitive. If you are lucky it is 50% sensitive. So, every other individual with real lyme disease undergoing this paradigm of testing is going to be told, by their clinicians that the test is negative and unfortunately, many clinicians take that as …in fact, ruling out lyme disease…in fact, there is a law that was passed in virginia 2 years ago that requires clinicians when testing, to communicate that, if the test is negative it does not rule out the disease. They need to be followed clinically. In addition, testing the immune.. the antibody response, and paradoxically the sick of an individual is with lyme disease, which can adversely impact immune function, the more likely the blood test is going to be negative using this paradigm. As opposed to some of these technologies, which I mentioned earlier. So the sensitivities of the paradigm are poor to begin with and not even that much, more insensitive or less sensitive in these sicker individuals. And I talked about newer technology.

Jennifer Crystal: On the flip side of treatment, what new research is being done on prevention?

Dr. Samuel Shor: Well, the major discussion was vaccines. There are human vaccines, then I will talk about

briefly looking at different proteins on the organism *Borrelia burgdorferi* . I am not sure this was discussed at the conference but there is some discussion about vaccines for the saliva of the tick, because that is going to be a more broad spectrum coverage. Because one of the concerns that we have in relation to lyme disease is not only the multiple strains to which Dr. Leigner alluded, but the fact that they are so many co-infections than if you have a vaccine for one organism, you are not necessarily going to protect against another ones. But if you have vaccine against the saliva that mounds an acute immune response at the time of the blood meal that is taken by the tick, there is a potential that you can have a broad spectrum response.

Then there is a concept of immunizing the mice. There is study being done in Massachusetts, that, because understanding the life cycle of Borrelia – where the tick, when it hatches is sterile. It is not infected. It has to take blood meal of usually small rodents and very commonly the white footed mouse. And there is research being done to somehow sterilize the mice so that when the tick takes blood meal, it is not necessarily going to become infected. So there is some exciting work being done.

Jennifer Crystal: That is very exciting to hear. Thank you so much.

Priya Menon: Jennifer. Thank you so much. We are almost short of time now. Probably will open it up for some QA, take some patient questions. I know you have some more questions for Dr. Shor and Dr. Moorcraft, but based on time, I think we should take some patient questions right now. I will just open up for QA. If you have a question for the panel. Please dial in using 718-664-6574. You can press 1 on your keypads and we will bring you on air to ask questions. I want the expert panel to know that we have received more than 50 questions and audience, it is mostly impossible to cover all the questions here. But what we will do is we will try to pick up the common topics that have come up, and get the panel to answer some of them. Doctors we need very brief answers for this, so that we can touch upon most of the topics that have been mentioned in the questions. Dr. Leigner, can Lyme disease cause dental problems?

Dr. Kenneth Leigner: That is a really good question, and I am not sure I am well equipped to answer that. Certainly it can affect the nerves that subserve the face and the teeth. And I have heard of patients complaining of dental issues attributed to lyme. I don't think I can really answer that question from my own experience very well. I am sorry.

Priya Menon: That is OK. Dr. Moorcraft we have received a lot of questions on alternative and natural therapies of lyme disease. Could you please educate us regarding available holistic and natural treatments.

Dr. Thomas Moorcraft: Sure. A lot of our medications actually come from either fungi or different herbals originally and then we sort of synthesize them in a lab and so if we look back at sort of cultures throughout the ages, they have been using herbs to have anti-infective and anti-microbial properties, very successfully for a long period of time. I will just quickly run through some of the things. From the anti-infective perspective we have the ability to use herbals in both teas and tinctures. They also come in capsule forms and so there is tons of different things out there that a well trained practitioner can help you with. Other parts that come along with sort of the alternative and natural therapies tends to be a real focus on the immune system and regulating naturally the immune system. We know that approximately 70% of the immune cells live in the gut wall. So focussing on the microbiome of the good and bad bacteria in the gut, as well as the fungus that are normally in our gut is very helpful.

We often can do this through dietary modifications and sometimes gentle dietary cleanses and certainly there is all kinds of other things that can be done there. Lots of people focus on different ways to naturally support detoxification which can be anything from homeopathic to different nutritionals depending on somebody may be deficient or not. Antioxidants such as glutathione or some of the precursors to Glutathione can potentially be very beneficial. Some of the old school treatment like using Alka seltzer or antacid to increase the pH and lower the acidity of the gut. Epsom salt sometime are used. Simple things like movement and taking advantage of the body's natural abilities, having a regular bowel movement and drinking good pure water often would fall into that. I think that is probably a quick summary of things that are out there. If we had more time we could dive much deeper.

Priya Menon: Thank you Dr. Moorcraft. Dr Shor what are your thoughts on the possibility of eradicating viruses that interfere with lyme disease treatment to support oligonucleotide technique?

Dr. Samuel Shor: Well, it is my perspective that viruses very often are dormant until there is an immune stressor. And the infection lyme disease really burgdorferi infection creates that stressor so that there are many viruses including Epstein Barr – EBV – which is classically thought of for mono. And other herpes viruses that become active when lyme becomes active. Generally, what I have found, in the majority of cases there may be bio involvement that treating the underlying bacterial infectious process, and in so doing, allowing the immune system to become more healthy, very often takes care of the viral load, so that we don't need to use antivirals. So that being said there are some people who have recurrent Zoster or other case HHV6 – Human Herpes Virus 6 – which independently can cause other systemic illnesses. Sometimes people will need antivirals to those infections.

Priya Menon: Thank you Dr. Shea. I know you spoke about neurological lyme. There is a question from a parent who asks – It has affected my daughter's ability to organize her thoughts and process information. What can we do to help her?

Dr. Leo J Shea III: Well, the first thing is we have to understand what are the components she is talking about and the only way that can be done is through a neuropsychological evaluation which will look at the panoply of cognitive issues, such as attention, concentration, the various types of memory, executive functions, multi-tasking. All of those things have to go into the development of a treatment plan. So, in order for anyone to develop a treatment plan that is effective, they have to first do the neuropsychological evaluation to know what strength the child has. The strength often can be offsetting of the weaknesses, if she knows how to use them effectively. But certainly one of the things a parent can do is immediately look at the functional life of the child and ask about the consistency of the family pattern. So is a child eating every day at the same time, are they exercising every day at the same time. Are they going to school every day at the same time. Or playing at the same time? Are they going to sleep every night at the same time. There has to be a consistent pattern within the child's functional life. That is the first thing that has to be implemented.

The second thing has to be within that consistent pattern of functionality what do we then have to do to help the specific child in the areas in which they are failing. There is quite a difference between someone failing in history or someone failing in language, than someone failing in mathematics. They are very different components of the brain that handle those areas. So you need to know, if those areas are presently in decline, how you can then implement, either a psychopharmacological intervention – which might be a psycho stimulant – it is not my preferred choice, but sometimes that is necessary. Or whether you develop a behavioral pattern within the family that will support that child. It takes a lot of work – 1. To do that, 2. To understand it and 3. To have the stamina to convince the child that consistency is the best path. Because most often children don't like that kind of approach.

Priya Menon: Thank you so much. Dr. Leigner, couple of people have wrote in asking whether lyme disease patients can donate organs?

Dr. Kenneth Leigner: That is great question. My personal view is that that could well be unwise. Because there is evidence of persistence that can occur. I would be very circumspect of that organ donation. People who have active lyme and once they have been treated, the question is have you eradicated the infection, despite the treatment. As Dr. Shor mentioned the recent article by Monica Embers group that was just published past December, that despite application of Doxycycline at a dose that many people assume to be curative, the infectious agent is still present. I don;t know if there is an official policy by those agencies that officially do organ donation. The same kind of question comes up with blood donation too. If people had had lyme disease and been treated for it, should they donate blood. I know that if a person has ever had Babesiosis, I am pretty sure it is forbidden, for them to donate blood or the blood banks don't accept it. I am not sure if there is blood bank policy that blood donations of people who have had lyme and been treated. Of course that could really pose a big problem, because so many people have contracted lyme, you start prohibiting them from donating blood you are not going to have many people to donate. So, I guess it is just

a personal opinion. I would be very circumspect about organ donation in people who have had lyme disease is my own opinion.

Priya Menon: We have actually crossed the time. Dr. Leigner would be great if you could just tell us a little bit about ongoing clinical trials that lyme patients need to keep track of and then we can wrap up for today.

Dr. Kenneth Leigner: Golly! At the present time I am unaware of any formal sponsored clinical trial through the treatment of lyme disease right now. I think lot of the so called trials or the treatment that are going on are trying to expand the approaches to lyme or those that are being attempted in the offices of frontline treating clinicians out of necessity. I think it has been many years since there been any formal government sponsored funded trials of different treatment methods. Now there is funded research in vitro meaning – in the test tube. For many years there was complete denial that there could be such a thing as persistent infection despite application of treatment in recent years the evidence has become so overwhelming that it is obvious that its a problem. Right now there were 3 excellent groups that are attempting to explore novel approaches. So far that has mostly been on the test tube. There is a Ying Zhang's group at Johns Hopkins which has been doing excellent work. Kim Louis at Northeastern University has been doing very interesting work and also J Raja Das at Stanford. So what a lot of them have been doing is taking agents that are existing in the pharmacopoeia – meaning that they are already FDA approved drug and trying agents that nobody would ever think before to use for lyme disease. And just trying different combination of agents and finding things that are quite surprising – actually have activity. So, that is encouraging and I think we may stumble upon something very clinically useful.

On the other hand, others have argued that we really need to not just use agents that already exist, but really with a deeper understanding of the biology of Borrelia and some of these tick borne diseases, really try to innovate with new approaches – that are not just the common antibiotics or antimicrobials but new agents that can really intelligently target some Borrelia strategic point in the biology of these organisms that can really knock them out and result in a definitive cure. Of course that is the goal. Good thing is that, that type of work is occurring, a lot of that work is funded by private organizations including the global lyme alliance – has been doing excellent choices on what to fund.

Priya Menon: Thank you so much. I think there is a need for more programs as this so that we can share and inform all the people who have been listening – lyme disease patients and caregivers. It is certainly important to spread this information now. The CDC estimates that over 300 thousand people in US are diagnosed with lyme disease with each year. It is one of the fastest growing vector borne infectious diseases in the US and western Europe as well as other countries. So I think all this information that we have share today is absolutely invaluable. Thank you so much Dr. Leigner, Dr. Shea, Dr. Moorcraft and Dr. Shor. We have some more questions for you. Probably we will try to get them answered from you at a later point.

Jackie and Jenifer – great questions. Sorry Jennifer we could not complete your list of questions. Probably we will have a part 2 for this, and get to them.

This talk will be made available on CureTalks.com for replay. Please visit curetalks.com for details on upcoming talks. Thanks a lot. Have a great evening.