MEMO

March 30, 2015

To: Derek Sennes
From: Elizabeth Aaroe
Re: Persistent Infection in Lyme disease – IDSA 28-day protocol – Embers Study

In today's hearing Senator Knopp queried as to why Oregon still only permits IDSA's 28-day protocol for treating Lyme when so many patients testified that they needed and had received months to years of treatment.

First, it must be clarified that the IDSA 28-day protocol is specified only for treating early disseminated Lyme disease (defined as four months after inoculation) and does not address treatment for secondary (widely disseminated) and tertiary (chronic) stages of the disease.

I suggested to the Committee that it familiarize itself with the Embers study. This study was published in 2012, using Rhesus monkeys, and was specifically modeled after the NIH-funded Klempner trial completed in 2001 that assessed the effectiveness of retreating patients with chronic Lyme disease. Oddly enough, the Embers study was funded in 1998 with the hope that the results of the two studies would be published at the same time. For reasons unknown, the publication of the findings of the monkey study, which contradict the Klempner study, was delayed for 11 years.

The ongoing debate over the appropriate treatment of tick-borne diseases, inclusive of Lyme, persists because IDSA continues to deny the existence of persistent infection. Embers is one of the latest in a number of compelling studies to demonstrate persistence in animal models despite antibiotic treatment.

The critical takeaway from this ground-breaking study is that Lyme disease may persist, is hard to treat and difficult to diagnose when negative lab tests do not accurately reflect actual infection.

The significance of the findings cannot be overstated. The study contradicts the foundation of the IDSA guidelines. The doctors and colleagues found that the bacterium that cause Lyme disease, *Borrelia burgdorferi (Bb)*, persists in infected monkeys despite treatment. Its findings further suggest diagnostic limitations based on the EM rash as well as the inappropriateness of IDSA short-term treatment protocols.

The Embers findings discount both the effectiveness of the IDSA 28-day treatment protocol for treating early-disseminated Lyme disease and that of the 90-day treatment protocol for treating late-disseminated Lyme disease. Since the presence of *Bb* was confirmed in the study, researchers concluded that the C6 antibody test gives false negative results; it is not sensitive enough to detect active disease in those who have not been infected for more than a few months or those who have persistent infection despite treatment.

The study concludes: "Reliable procedures to determine the infection has been cleared from Lyme patients have not been established." Since the Embers study suggests that antibody lab tests fail to detect Lyme disease roughly 50% of the time, the IDSA testing requirements will leave many patients undiagnosed and untreated.

Study Findings:

IDSA 28-day protocol

1) *Bb* persisted in 100% of treated monkeys. This suggests that at four months post-infection, 28 days of treatment with doxycycline may be insufficient to eradicate infection. Persistent infection was demonstrated by other means including PCR, culture, immunofluorescence and xenodiagnoses.

IDSA 90-day protocol

2) *Bb* persisted in approximately 75% of the infected monkeys. This suggests that different treatment approaches – longer or involving different or combined antibiotics – may be more appropriate when Lyme disease has been present for more than six months. The authors state: "[T]he use of variable pulse-dosing regimens of antibiotics may improve efficacy and this warrants testing in an appropriate model."

Does the C6 antibody test accurately measure active infection?

3) The C6 antibody test detected active infection 100% of the time 27 weeks after inoculation for untreated monkeys. After 27 weeks, however, antibody response began returning to baseline and the test failed to detect active infection in approximately 60% of the untreated monkeys. The antibody test also failed to detect active infection in 100% of the treated monkeys. This suggests the C6 test is not sensitive enough to detect active disease in those having the disease for more than a few months or those who treated still have persistent infection.