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Biofilms and Lyme Disease

Dr. Sapi received her Ph.D. degree in Genetics from the University of Eotvos Lorand (Budapest Hungary). She is a Professor and Department Chair at the University of New Haven (Connecticut) where she teaches undergraduate and graduate level biology courses and carries out Lyme disease research with her students. To date, over 80 graduate students have received training in Lyme disease related research.

Her recent studies investigate the different forms of Borrelia burgdorferi to better understand how Borrelia can hide from the immune system as well as from antimicrobial therapies. Her recent research shows that Borrelia burgdorferi is capable forming a protective layer around itself – called biofilm – which could render it to be very resistant to antibiotics and provide a logical explanation as to why extensive antibiotic treatment for patients with a tick-bite history could fail. The goal of her research group is to fully characterize this novel form and to identify novel antibacterial agents that are effective in killing all forms of Borrelia burgdorferi.

Dr. Sapi also organized and chaired seven Lyme Disease Symposiums at the University of New Haven during the last several years.

https://www.facebook.com/UNH.LymeGroup

Conference Lecture Summary

Lyme disease patients are treated with various antibiotics though the rates of relapse and recurrence of the disease are frequent after discontinuing the antibiotic treatment. It was proposed earlier that the observed antibiotic resistance and reoccurrence of Lyme disease might be due to the formation of defensive morphological forms of *Borrelia burgdorferi*. In addition to its familiar spirochete form, *B. burgdorferi* can transform from motile spirochetes into round body and biofilm forms in the presence of unfavorable environmental conditions including the presence of antimicrobial agents. Our laboratory has demonstrated that *B. burgdorferi* biofilm formation enhances the antibiotic resistance of the organism to various antimicrobial agents, which previously showed some success against the spirochete and round body forms of *B. burgdorferi*. This data strongly suggests that Borrelia biofilm could play significant role in their survival in diverse environmental conditions by providing refuge to individual cells. However, the question remains if these structures can be found *in vivo* and whether these biofilm structures hold significant relevance for the survival strategies for *Borrelia spp*. in infected tissues.

In this presentation, we provide evidence of Borrelia biofilm presence in various human organs obtained from autopsy tissues of a well-documented Lyme disease patient who died despite of multiple rounds of antibiotic treatments. Findings of the role of Borrelia biofilm in inflammatory processes will be also discussed as well as our recent metagenomics findings indicating potential co-infection in Borrelia biofilms.