

Jenniffer Stetler

Animal Sciences, Biochemistry

Year in School: Junior

Hometown: Potosi, Mo.

Faculty Mentor: Dr. Charles R. Brown, Veterinary Pathobiology

Funding Source: McNair Scholars Program

Role of Cyclooxygenase-1 during the immunological response in Lyme arthritis

Jenniffer LM Stetler & Charles R. Brown

Previously, pharmacological inhibition of COX-1 in wild-type C3H mice resulted in changes in antibody production in response to infection with the causative agent of Lyme Disease, the spirochete *Borrelia burgdorferi* (Bb). These results suggest that the changes seen in the progression of Lyme Disease, including joint inflammatory arthritis and clearance of Bb may be due to the COX-1 enzyme. A murine model of Lyme Disease using C3H/HeJ strain was used. Progression of Lyme Disease inflammation was followed from the day of infection through day 21 post-infection by correlating histology of ankle inflammation, quantitative PCR determination of Bb load in inflamed ankle and in ear, and quantitation of the production of cytokines, chemokines and eicosanoids in inflamed knee joints. The response to Bb infection in wild type C3H mice was compared to development of inflammation in C3H mice made genetically deficient for the COX-1 gene. In both wild type and COX-1 knockout mice, experiments are being conducted to observe histological changes post infection, including changes in cellularity and tissue organization. Currently, the ability of each mouse strain to clear the infecting Bb is being determined by using quantitative PCR to compare the incidence of Bb genomes to a mouse reference gene. Finally, experiments are being conducted to compare the cytokine and chemokine secretion responses and patterns of eicosanoid production of the wild type mice to their COX-1 knockout counterparts determine if changes in inflammatory mediators result from loss of COX-1 function. The data produced in this study will be analyzed in order to define differences of wild type mice and COX-1 mice in the induction and resolution of inflammatory processes in response to Bb infection in a mouse model of Lyme Disease. This experiment provides valuable insight into the causes of Lyme arthritis and help to explain the differences in antibody responses observed after COX-1 pharmacological inhibition or genetic deletion.