THE GRADUATE COLLEGE OF THE

UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER

ANOUNCES THE FINAL EXAMINATION OF

BINU SHRESTHA

FOR THE DEFENSE OF THE DOCTOR OF PHILOSOPHY

GRADUATE COLLEGE
DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY

Monday, August 15, 2016
Biomedical Research Center, Room 109, OUHSC

IDENTIFICATION AND CHARACTERIZATION OF NOVEL BORRELIA BURGDOFERI OUTER MEMBRANE PROTEINS

COMMITTEE IN CHARGE: Darrin R. Akins, Ph.D., Chair , David W. Dyer, Ph.D., Felicia Qi, Ph.D., Michelle Callegan, Ph.D., Eric W. Howard, Ph.D.

ABSTRACT: Lyme disease, caused by the pathogenic spirochete *Borrelia burgdorferi*, is a tick-borne disease leading to multisystem disorders including arthritis, carditis and various neurological disorders. In the absence of an effective vaccine to prevent this debilitating disease, substantial research studies have been aimed at identifying novel integral outer membrane proteins (OMPs) that could be used as new vaccine targets or disease-modulating therapeutics. Identification and characterization of novel *B. burgdorferi* OMPs will also improve our insight on the unique physiology of this spirochete. We recently identified two candidate OMPs from the enriched OM fractions of *B. burgdorferi*, encoded by ORFs *bb0405* and *bb0406*, which are co-transcribed on a single mRNA transcript. Cellular localization and liposome incorporation experiments collectively confirmed that both BB0405 and BB0406 are borrelial OMPs. Given that BB0405 and BB0406 are paralogous proteins and BB0405 has recently been established as an essential virulence factor during mammalian infection, potential roles for BB0405 and BB0406 during mammalian infection were investigated. Both BB0405 and BB0406 were actively expressed during infection of nonhuman primates and antibodies generated against the proteins are borreliacidal, indicating they are prime vaccine candidates. Interestingly, only BB0405, and not BB0406, was observed to be essential for *B. burgdorferi* infectivity in mice. Future studies will be required to identify the functions of these novel OMPs in *B. burgdorferi* virulence and Lyme disease pathogenesis.