THE GRADUATE COLLEGE OF THE

UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER

ANNOUNCES THE FINAL EXAMINATION OF

HENNA IQBAL

FOR THE DEFENSE OF THE DOCTOR OF PHILOSOPHY DEGREE
GRADUATE COLLEGE
DEPARTMENT OF MICROBIOLOGY & IMMUNOLOGY

Wednesday, July 27th, 2016, 10:00 a.m.
Room 109, Biomedical Research Center, OUHSC

Characterization of a Unique Translocation and Assembly Module B (TamB) Ortholog from *Borrelia Burgdorferi*

COMMITTEE IN CHARGE: Darrin R. Akins, Ph.D., Chair , Felicia Qi, Ph.D., David W. Dyer, Ph.D., Zachary Dalebroux, Ph.D., Paul DeAngelis, Ph.D.

ABSTRACT: Two outer membrane protein (OMP) transport systems in diderm bacteria that assist in assembly and export of β-barrel OMPs have currently been identified. These two systems are the β-barrel assembly machine (BAM) complex and the translocation and assembly module (TAM) complex. The BAM complex consists of the principal OMP component BamA along with several other OM-

associated accessory proteins. The TAM complex also consists of an OMP, designated TamA, and a single inner membrane (IM) protein, TamB, which is co-transcribed with TamA. Together TamA and TamB aid in the secretion of virulence-associated OMPs. In this study we characterized the hypothetical protein BB0794 in *B. burgdorferi,* which is encoded upstream of BamA and contains a DUF490 motif, which is a conserved domain found in TamB and TamB-like proteins. Although spirochetes lack a TamA ortholog, computational and physicochemical characterization of BB0794 from *B. burgdorferi* revealed that it is anchored to the IM similar to TamB from *Escherichia coli* and that it interacts with BamA. Interestingly, IPTG-regulatable mutants of *bb0794* displayed altered cellular morphology and antibiotic sensitivity. The novel observation that a TamB ortholog interacts with BamA and is required for proper OM biogenesis in this spirochete suggests a newly identified role for TamB-like proteins, and may explain why almost all diderms harbor a TamB-like protein but only a select group encodes TamA.