



Travis Bourret, Ph.D.

Assistant Professor
Department of Medical Microbiology & Immunology
Creighton University
Omaha, Nebraska

Abstract

“Metabolic regulation of *Salmonella* antioxidant defenses”

Salmonella encounter diverse environmental challenges throughout the course of infection including shifts in pH, nutrient availability, osmolarity, oxygen availability, as well as reactive oxygen species (ROS) and reactive nitrogen species (RNS) produced by the innate immune response. Recent investigations have begun to shed light on the essential contributions of central metabolic pathways to *Salmonella* virulence. We recently reported that transketolases, the rate-limiting enzymes of the nonoxidative branch of the pentose phosphate pathway (non-oxPPP), are essential for *Salmonella* virulence in a murine model of infection. *Salmonella* harbors 3 transketolase isoenzymes (TktA, TktB, and TktC), each of which carry out canonical transketolase enzymatic reactions. Transketolases catalyze enzymatic reactions that channel carbon from the oxidative branch of the pentose phosphate pathway (oxPPP) back to glycolysis, and are capable of generating precursors for LPS, nucleotide, and amino acid biosynthesis. Recently, we have found that transketolases also play a novel role in the resistance of *Salmonella* to host-derived ROS and RNS, which is independent of the antioxidant defenses fueled by the oxidative branch of the pentose phosphate pathway through the reduction of NADP⁺ to NADPH.

Bio-Summary (cont'd.)

Dr. Travis Bourret is an Assistant Professor in the Department of Medical Microbiology and Immunology at Creighton University. He received his B.S. degree from the University of Nebraska at Lincoln in 2002, and his Ph.D. in Microbiology and Immunology from the University of Colorado Anschutz Medical Campus in 2008. Dr. Bourret received an Intramural Research Training Award (IRTA) to serve as a postdoctoral fellow in the laboratory of Dr. Frank Gherardini at Rocky Mountain Laboratories, NIAID, NIH from 2008 – 2012. Dr. Bourret served as an Assistant Professor the Department of Biology at the University of Nebraska at Kearney from 2012-2014, prior to his current position at Creighton University. The primary focus of Dr. Bourret's research is to determine how host- and vector-borne reactive oxygen species (ROS) and reactive nitrogen species (RNS) impact the gene expression, metabolism, and overall virulence of the enteric pathogen *Salmonella enterica* serovar Typhimurium, along with the Lyme disease spirochete *Borrelia burgdorferi*.