SMALL CONSERVED UNIVERSAL STRESS PROTEINS IN SEVEN SALMONELLA ENTERICA GENOMES WITH POTENTIAL ROLE IN CELL-CELL AGGREGATION IN NON-HOST ENVIRONMENTS

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Abstract: The genus Salmonella consist of Gram-negative facultative rod-shaped bacteria that intestinal tract in warm blooded animals. Salmonella causes typhoid fever, paratyphoid fever, and foodborne illness. The January 2009 multistate outbreak of Salmonella infections associated with peanut butter and peanut-butter containing products in the United States has brought again to the forefront the need to understand the intrinsic features that enable bacteria pathogens to survive a variety of food processing conditions. Genes encoding the universal stress protein (USP) domain are known to provide a variety of pathogenic bacteria with ability to adapt to changing growth and host conditions. The UspA of Salmonella typhimurium LT2 makes an important contribution to the in vivo virulence of the strain in mice. The objective of this study was to analyze the functional annotations for unique features associated USP genes of Salmonella with genome sequencing projects. The Integrated Microbial Genome Database contains 38 annotated Salmonella genomes encoding 226 genes encoding proteins with the universal stress protein domain. The USP gene count per genome range from 3 (enterica serovar Typhi 404ty) to 7 (enterica serovars: Javiana GA_MM04042433; Kentucky CDC 191 and Typhi AG3). A total of 30 genomes had a gene count of 6. Seven enterica serovars (Paratyphi B SPB7; Newport SL254; Heidelberg SL476, CVM30485; Schwarzengrund CVM19633; Agona SL483; Dublin CT_02021853; and Paratyphi C RKS4594) had universal stress proteins with length 97aa. Multiple sequence alignment revealed that these genes have 100% conservation of the amino acid sites. Most of the genes are annotated as UspG following the nomenclature of the Escherichia coli USP genes. Deficiency in E. coli UspG led to impaired ability to form cell aggregates. There is a need to determine the link between the UspG of these Salmonella and the thin aggregative fimbriae (Tafi) that mediate cell-cell aggregation. In Salmonella isolates, cell-cell aggregation observed in the rdar morphotype is expressed under conditions of low, osmolarity, nutrient limitation and temperatures below 30 °C.

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