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Non-labeled quantitative proteomic comparison identifies differences in acid resistance between *Escherichia coli* O157:H7 curli production variants

Nereus W. Gunther
United States Department of Agriculture, USA

Abstract

To understand the nature and pathogenic potential of a bacterial strain it is necessary to be able to identify and measure the proteins expressed in any given situation. In this research the entire protein complements produced by *Escherichia coli* O157:H7 strain 48394OW and its naturally occurring curli producing variant 48394OR were compared to better understand the pathogenic abilities of these two closely related strains. A non-labeled proteomic comparison was performed utilizing the spectra counting and peptide fractionation abilities of a Q-Tof mass spectrometer to identify and quantitate the proteins produced by the two strains. The process reliably identified and measured the concentration of 418 proteins from strains 48394OW and 48394OR within three separate biological replicates. From these two sets, 59 proteins were identified that were preferentially expressed in strain 43894OW compared to 48394OR and 14 proteins that were conversely preferentially expressed in 48394OR. A subset of the preferentially expressed proteins was assayed to determine if their levels of gene transcription corresponded with the observed protein expression. From the resulting list of confirmed differentially expressed proteins, it was observed that the proteins contributing to acid survival: GadA and GadB, were overexpressed in 48394OW compared to 48394OR. The predicted enhanced acid resistance phenotype of 48394OW was confirmed by experimentation at pH 2.5. Additionally, a knockout mutation in the *csgD* genes of the 48394OR strain was constructed and suggested that CsgD had a repressive effect on acid survival in 43894OR.

Biography

Gunther received his PhD from the University of Maryland, Baltimore in 2001. This was followed by two post–doctoral appointments; the first at GlaxoSmithKline and the second in the Fats, Oils and Animal Co-products Research Unit of the United States Department of Agriculture. Dr. Gunther is currently a research molecular biologist in the Molecular Characterization of Foodborne Pathogens Research Unit of the United States Department of Agriculture. His research focuses on utilizing comparative proteomic and genomic techniques to investigate the capabilities of *Escherichia coli* and *Campylobacter* species to persist in food and food processing environments.