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The role of invG in Salmonella enterica adherence to and invasion of human intestinal epithelial cells

Nontyphoidal Salmonella enterica are primary foodborne pathogens infecting both humans and animals worldwide. Among nontyphoidal Salmonella, the serovar Typhimurium (S. Typhimurium) and serovar Enteritidis (S. Enteritidis) are the most common Salmonella serovars implicated in foodborne illness in the United States and Europe. Recently, we identified an immunogenic protein of S. Enteritidis called InvG, which is currently being investigated as a vaccine candidate to reduce Salmonella colonization and shedding in layer chickens. The invG was shown to be involved in S. Enteritidis adherence to and invasion of chicken intestinal epithelial tissues. The long-term goal of the proposed study is to assess the suitability of InvG as a vaccine candidate against human foodborne infection. As the first step, in this preliminary study, we plan to evaluate if invG is involved in the adherence and invasion of S. Enteritidis and S. Typhimurium to the murine gut similar to what we observed in the chicken gut.

Specific aims:
1. Study the role of invG in S. Enteritidis and S. Typhimurium adherence and invasion of human intestinal epithelial cells using an in vitro cell invasion assay established.

2. Perform a time course analysis of invG expression using a reverse transcription quantitative PCR (RT-qPCR) during interaction of Salmonella with intestinal epithelial cells.

Student's role:

1. Create an isogenic mutant of S. Typhimurium lacking the invG and its complemented strain (we have already constructed the □invG S. Enteritidis strain and the corresponding complemented strain). Student will begin the experiments with S. Enteritiids while the mutant strain of S. Typhimurium is being created.

2. Establish the monolayers of Caco-2 cells (ATCC HTB-37) and perform adherence and invasion assays using wild-type, mutant, and complemented strains.

3. Bacterial RNA purification from cell culture assays and perform RT-qPCR to measure invG expression.

4. Statistical analysis of data and drafting the manuscript.