Alteration of *Campylobacter jejuni* pathogenesis with linoleic acids over-producing *Lactobacillus casei*

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Problem Statement: *Campylobacter* is one of the most common causes of foodborne illness in the US and Europe. More than 90% of cases of campylobacteriosis are caused by *Campylobacter jejuni* (CJ). Poultry and poultry products are major sources of campylobacteriosis. Appropriate measure to reduce the colonization of CJ in chicken gut is required to control campylobacteriosis.

Approach: Recently, we found that in the presence of prebiotic-like components (peanut flour), production of metabolites specifically linoleic acid (LA) by *Lactobacillus casei* (LC) increased 100 folds and that higher concentration of LA could outcompete several enteric pathogens, including CJ. Therefore, we developed a genetically engineered LC strain by overexpressing linoleate isomerase (*mcra, myosin cross-reactive antigen*) gene and named as LC^{+mcra}. We also verified the ability of LC^{+mcra} to inhibit CJ growth, adhesion, and invasion of chicken cells with or without natural poultry growth promoter, such as berry pomace extracts (BPE).

Results: Both LC^{+mcra} itself and its byproducts inhibited the growth of CJ more than 6 logs within 48 h. We also found that LC^{+mcra} and its byproducts reduced both adherence and invasion ability of CJ to the chicken macrophage (HD-11) and fibroblast (DF-1) cells, altered the expression of virulence genes (*ciaB*, *cdtB*, *cadF*, *flaA* and *flab)* and physiological properties (motility and hydrophobicity) of CJ. In mixed culture condition, LC^{+mcra} with CJ in the presence of BPE amplified these effects including CJ growth inhibition (>3 log CFU/mL) and disrupting host cells-CJ interactions. Cell-free cultural supernatant (CFCS) of LC^{+mcra} in the presence of BPE also showed reduction of CJ growth, interaction of CJ with DF-1 and HD-11 cells, and expression of multiple CJ virulence genes.

Conclusion: This finding indicates that BPE and LC^{+mcra} in combination might be able to prevent colonization of CJ in poultry and reduce cross-contamination in poultry products that cause campylobacteriosis in human.