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Metabolic Analysis of *Vibrio parahaemolyticus* in Different Salinity

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Summary

Vibrio parahaemolyticus, a gram-negative halophilic bacterium, is a significant causative agent of food-borne gastroenteritis. This bacterium is isolated and identified in Japan in 1950. This microorganism causes acute gastroenteritis, the most common clinical symptoms include diarrhea with abdominal cramps, nausea, vomiting, headache, and low-grade fever. The genomic analysis revealed the presence of two sets of type III secretion system (T3SS1 and T3SS2) in *V. parahaemolyticus*, some studies reveled the function and regulation of those of virulence factors.

V. parahaemolyticus is known as a halophilic bacterium that proliferation is activated in a 3% salt condition. The bacterium need to adapt in the intestinal tissue condition, 0.9% salt, in infection state. However, relationship between the salt condition and the pathogenicity or energy metabolism are not considered in previous study. In this study, we estimated the pathogenicity and energy metabolism changes by the different salt condition in *V. parahaemolyticus*.

As a result, the mRNA expression level of the T3SS1-related gene was increased in salt stimulation, and the secretion of the T3SS1 effector protein VP1680 was also enhanced in the 3% salt containing medium. However, there are no difference about T3SS1 mediated cytotoxicity for host epithelial cells in salt stimulation. Here, we could not find salt mediated up regulation of T3SS1, functionally. On the other hand, the amino acid consumption in the culture medium was different between the high-salt and the low-salt environment, also the production of organic acid in the culture medium was not same in salt condition. Our study revealed that the pathogenicity and the energy metabolism in *Vibrio parahaemolyticus* were partially regulated by salt concentration. Those results suggest a relationship between the salt environment recognition and pathogenicity or energy metabolism in *V. parahaemolyticus*. Identification of the mechanism of environmental adaptation and pathogenicity activation in *V. parahaemolyticus* may serve good information for makeup of new preventive method for food poisoning.