

**Title: Comparison in the Recovery of *Vibrio vulnificus* Under Different Microbial Stresses with the use of Sodium Pyruvate**

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Abstract:

*Introduction:* *Vibrio vulnificus* is an environmentally ubiquitous marine organism that causes severe disease in at-risk individuals consuming contaminated raw shellfish. The organism has been challenging because of its propensity to injury and entry into the so-called “viable but non-culturable” (VBNC). It has been suggested that injury and perhaps VBNC may be manifested by increased sensitivity to hydrogen peroxide.

*Purpose:* The purpose of this study was to evaluate sodium pyruvate supplementation as a means to improve the recovery of sublethally injured *V. vulnificus*.

*Methods:* *V. vulnificus* ATCC 27562 was submitted to various processing related stresses, including freezing and thawing (-20°C), starvation, cold temperature storage (5°C), cold temperature adaptation (15°C for 4 h then 5°C) and exposure to various organic acids (pH 4.0 and 3.5). Cells were recovered on tryptic soy agar-2% NaCl with and without sodium pyruvate supplementation. Survivor curves were plotted and D-values calculated and compared using ANOVA.

*Results:* There were statistically significant differences ( $p < 0.05$ ) in the recovery of *V. vulnificus* on supplemented versus non-supplemented media, with higher D-values found using supplemented media. For instance, under starvation conditions, D-values were  $11.64 \pm 1.54$  d vs.  $7.52 \pm 0.86$  d using supplemented and non-supplemented media, respectively. Likewise for cold storage (D-values  $4.91 \pm 0.13$  vs.  $2.15 \pm 0.18$  d, respectively), cold adaptation (D-values  $9.74 \pm 1.44$  vs.  $2.84 \pm 0.28$  d, respectively), and pH 3.5 (D-values  $18.83 \pm 6.25$  vs.  $5.20 \pm 0.24$  min, respectively).

*Significance:* These data suggest that media supplementation with sodium pyruvate may aid in the recovery of *V. vulnificus* cells sublethally injured by exposure to food processing-related stresses.