Variability in the adaptive acid tolerance response phenotype of *Salmonella enterica* strains

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ABSTRACT

The objective of this study was the assessment of the stationary-phase, low-pH-inducible acid tolerance response (ATR) of different *Salmonella enterica* strains. For this purpose, 30 strains of the pathogen were grown in tryptone soy broth in the absence (non-adapted cultures) and presence (1% w/v; acid-adapted cultures) of glucose, and then subjected to 4-h acid challenge trials at pH 3.0. Surviving populations of each strain were determined at 1-h intervals, and the Weibull model was fitted to the derived microbiological data. Extensive variability in the acid stress responses of the tested *S. enterica* strains was observed, with the total population reductions (log CFU/ml) attained in 4 h of acid challenge ranging from 0.9 to 5.5 and from 0.6 to 7.0 for the non-adapted and acid-adapted cultures, respectively. As demonstrated by the model scale parameter δ and shape parameter p, the effect of acid adaptation on the inactivation curves was strain-specific. Although acid adaptation resulted in enhanced acid survival for the majority of the tested strains, there were strains exhibiting similar or decreased acid resistance compared to their non-adapted counterparts. Moreover, acid adaptation appeared to decrease the strain variability of δ whereas increasing the strain variability of p: the coefficient of variation of δ among the tested strains was 97.2 and 54.9% for the non-adapted and acid-adapted cultures, respectively, while the corresponding values for p were 12.7 and 48.1%. The data of the present study, which is the first one to systematically evaluate the adaptive ATR of multiple *S. enterica* strains, clearly demonstrate that this phenotype (attempted to be induced by growing the pathogen in the presence of glucose) is strain-dependent.