

Morphological changes of temperature- and pH-stressed *Salmonella* following exposure to cetylpyridinium chloride and nisin

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Abstract

The outer membrane of Gram-negative bacteria such as *Salmonella*, act as a permeability barrier, preventing nisin gaining access to the cytoplasmic membrane. If the outer membrane permeability is reduced, however, Gram-negative bacteria can show nisin sensitivity. In this study, temperature stresses (heating, chilling and freezing), pH stress (pH 4.5, 5.0, 6.0) and cetylpyridinium chloride (CPC)-nisin treatment were used to alter the outer membrane permeability of *Salmonella*, producing a loss of barrier function and reduced resistance to nisin. The morphological changes in *Salmonella* were examined using scanning electron microscopy. Temperature and pH-stressed *S. typhimurium* cells, untreated and treated with CPC-nisin had perturbed cell morphology, including apparent indentations and craters in the cell surfaces and collapsed amorphous bodies.

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