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Cold stress tolerance of foodborne pathogens

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Foodborne pathogens are subjected to different types of stresses, including cold stress, both in the environment and during food processing and preservation. To survive these stress conditions, bacteria should adapt to these changing environments. A small group of foodborne pathogens are of special interest due to their ability to exhibit cold tolerance. *Bacillus cereus, Yersinia enterocolitica, Y. pseudotuberculosis, Listeria monocytogenes* and non-proteolytic *Clostridium botulinum* type E have been shown to be able to grow and/or produce toxins at refrigeration temperatures. Cold stress adaptation mechanisms may be critical for their potential to reach infectious levels in refrigerated foods. Understanding the mechanisms underlying cold tolerance in these organisms would be important for design of science-based control mechanisms aimed at preventing replication and/or toxin production of these agents in foods. As a consequence of decreases in temperature, a number of cellular changes occur in the cell. These include reduction in membrane fluidity, stabilization of the secondary structures in nucleic acids, increase in negative supercoiling of DNA and unfolding or improper folding and methylation of proteins. To overcome the negative impact of these changes, bacteria have evolved mechanisms for maintenance of cell membrane fluidity and nucleic acid secondary structure, uptake of compatible solutes, and production of various cold shock and cold acclimation proteins. Although certain cold-induced cellular changes have been characterized (mostly with selected model systems), key mechanisms for cold sensing and signal transduction in foodborne pathogens remain to be characterized. Further studies are needed to elucidate mechanisms underlying cold tolerance of these bacteria.

Biography

Reha Onur Azizoglu completed his graduate studies and post-doctoral training on foodborne pathogens at North Carolina State University. He is currently working as a Senior Scientist at Advanced Animal Diagnostics Inc. and serving as a Visiting Scholar at North Carolina State University. He published number of papers in peer-reviewed journals and he is a member of editorial board in a leading microbiology journal.

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