SAAFoST
SOUTH AFRICAN ASSOCIATION for FOOD SCIENCE & TECHNOLOGY
CONGRESS 2021
Welcome to SAAFoST's 24th Biennial International Virtual Congress
20 – 22 September 2021

Persistence of Listeria Monocytogenes in Food Processing Environments: The Role of the Persister Cell State

Thulani Sibanda, Elna M. Buys

Department of Consumer and Food Sciences, University of Pretoria, Private Bag X20, Hatfield 0028, Pretoria, South Africa

Abstract

Molecular subtyping of Listeria monocytogenes isolates associated with listeriosis outbreaks has invariably shown that contamination of finished products arises from strains resident in food processing plants with product contamination with the same strains often recurring over a long period of time. The underlying reasons for L. monocytogenes persistence are still elusive. This paper reports on the possible role of the persister cell state in L. monocytogenes survival of lethal acid stress. When stationary phase cultures of L. monocytogenes ATCC19115 were treated with increasing lethal doses of lactic acid, a recalcitrant population of survivors remained regardless of acid concentration. Cultures re-grown from the surviving population were as susceptible as the parental population. Further, carboxyfluorescein diacetate (CFDA) fluorescence analysis of the survivor population showed a reduced metabolic activity of survivors compared to a normalized control cell population. Combined, these observations indicated a lack of acquired acid stress resistance and a likely role of metabolic inactivity in the tolerance of survivors, a characteristic of persister cells. When the persister survivors were re-grown under conditions of mild acid stress and cold stress, no significant differences ($p > 0.05$) were observed in the expression levels of stress response genes sigB (alternative sigma factor B (σ^B) gadD2 (glutamate decarboxylase), oppA (oligopeptide permease), and lmo1722 (DEAD-box RNA helicase) between re-grown survivors and control cells. Overall, the findings suggest that the persistence of L. monocytogenes in the face of severe stress as is the case in processing environments could be attributed to a dormant persister cell state which does not show any adaptational advantage on growth resumption.

Biography: Thulani Sibanda

Dr Thulani Sibanda is Postdoctoral fellow at the University of Pretoria. He holds a PhD in Food Science from the University of Pretoria and a MSc in Microbiology from the University of Fort Hare. His research interests are on the modelling food pathogen responses and risk assessments, food safety and functional foods.