

Survival of sporadic and persistent *Listeria monocytogenes* through acidic conditions simulating stomach digestion

Mónica Oliveira, Joana Barbosa, Paula Teixeira*

Universidade Católica Portuguesa, CBQF—Centro de Biotecnologia e Química Fina Laboratório Associado, Escola Superior de Biotecnologia, Porto, Portugal

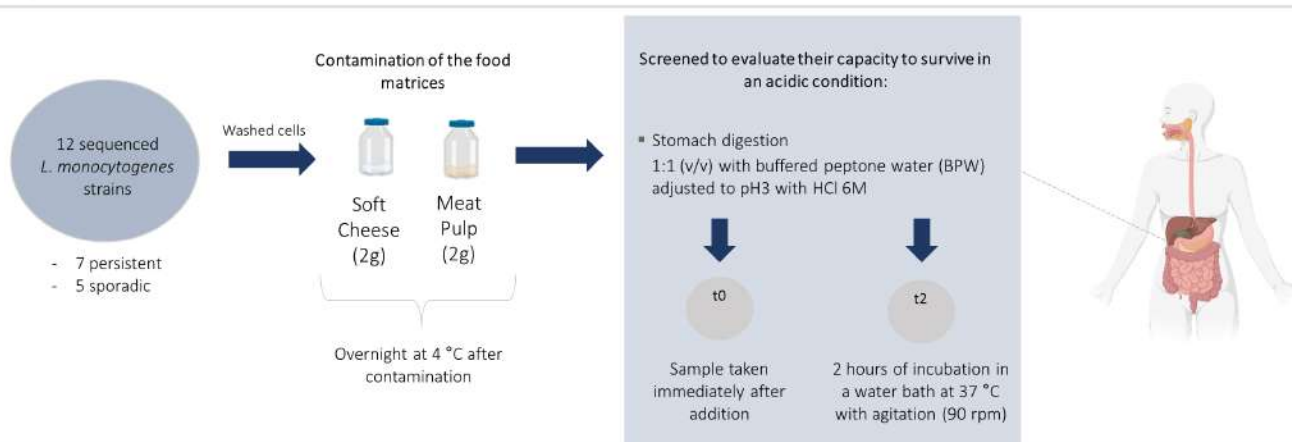
* Corresponding author: pcteixeira@ucp.pt

Introduction and Objectives

Listeria monocytogenes is a major human and animal foodborne pathogen that causes listeriosis, a disease with a high fatality rate (> 40%)^[1]. Listeriosis mainly affects high-risk groups, including neonates, pregnant women, the elderly, and immunocompromised individuals^[2]. After consumption of contaminated food, *L. monocytogenes* hold the capacity to cross the protective intestinal and placental epithelial barriers. The ubiquitous nature and ability to grow in harsh conditions make this pathogen difficult to control by the food industry^[3]. Some strains may be repeatedly isolated over time in the same plant for several months/years – persistent strains^[4] while others are recovered sporadically. This represents a significant challenge for the food sector as cross-contamination by the equipment and general food processing environment is one of the most important sources of food contamination. From a risk analysis perspective, it is also important to assess the virulence potential of these strains that represent a continual risk of contamination.

This study aimed to evaluate the survival of persistent and sporadic *Listeria monocytogenes* strains under acidic conditions, simulating stomach digestion, when incorporated into two food matrices.

Methods



Results



Figure 1. Survival of 12 strains (5 sporadic and 7 persistent *L. monocytogenes* strains) in an acidic condition when incorporated in two food matrices (soft cheese and meat).

- *Listeria monocytogenes* cells were reduced by approximately 0.3 and 0.6 log cycles when incorporated in meat and cheese, respectively.

- Meat has an apparent higher protective effect than cheese, possibly due to its high-fat content.

Conclusion and Relevance

Although preliminary, these results demonstrated that there seems to be no correlation between sporadic and persistent strains in surviving acidic conditions (stomach digestion). Further tests should be performed to evaluate the survival of these strains along the simulated gastrointestinal tract and to further investigate the impact of these persistent- and sporadic-strains on the gut microbiota.

References

- [1] V. Ferreira, R. Magalhães, G. Almeida, D. Cabanes, M. Fritzenwanker, T. Chakraborty, T. Hain, P. Teixeira. Genome sequence of *Listeria monocytogenes* 2542, a serotype 4b strain from a cheese-related outbreak in Portugal, *Genome Announcements*, 6(25) (2018) e00540-18.
- [2] B. Swaminathan, P. Gerner-Smidt. The epidemiology of human listeriosis, *Microbes and Infection*, 9(10) (2007) 1236–1243.
- [3] ILSI Research Foundation and Risk Science Institute. Achieving continuous improvement in reductions in foodborne listeriosis—a risk-based approach, *Journal of Food Protection*, 68(9) (2005) 1932–94.
- [4] V. Ferreira, J. Barbosa, M. Staszewicz, K. Vongkhanjan, A.M. Switt, T. Hogg, P. Gibbs, P. Teixeira, M. Wiedmann. Diverse geno- and phenotypes of persistent *Listeria monocytogenes* isolates from fermented meat sausage production facilities in Portugal, *Applied and Environmental Microbiology*, 77 (2011) 2701–2715.

Acknowledgements

This work was supported by National Funds from FCT - Fundação para a Ciência e a Tecnologia through project GenoPhenoTraits4Persistence - Genomic and phenotypic traits contributing to persistence of *Listeria monocytogenes* in food processing environment (PTDC/BAA-AGR/4194/2021). The authors would like to thank the scientific collaboration under the Fundação para a Ciência e a Tecnologia (FCT) project UIDP/00329/2020. Financial support for author Mónica Oliveira was provided by the doctoral fellowships 2021.08345.BD.